

FEBRUARY/MARCH 1980
VOLUME 5, NUMBER 1

Corporate Systems

TECHNOLOGY
FOR THE
SYSTEMS
DECISION
TEAM

**Fast computer access
helps National Airlines
streamline reservations**

**Great Northern Paper
pens communications gains
with digital facsimile**

**Colorado health center
undergoes WP treatment
and prognosis is good**

**Kidder Peabody is
bullish on OCR-assisted
text editing system**

**Colonial Penn ensures
fast mail delivery with
electronic sorters**

**Profile: Communications
in the Eighties**

Only Boorum and Pease micrographics let you grow without growing pains.

Growth and change in micrographic systems usually mean components become obsolete. Not so with Boorum & Pease. Nothing becomes obsolete. Everything remains compatible and productive as you add new elements to develop the most sophisticated system.

Only with B&P do you get this broad, first quality, versatile selection. No one comes close to matching B&P for so many options that start together, work together and stay together.

From panels to panel binders to panel racks. Rotary files, wall-mounted swivel files. Card Pockets to film cartridge holders to you-name-it. If the job involves film fiche, mag or aperture cards, B&P provides a variety of answers. And none of those answers will be here today, gone tomorrow.

Only Boorum & Pease lets you watch today's cost with an eye toward the future. Check with your Boorum & Pease dealer. He has eye openers on micrographic growth without the growing pains.

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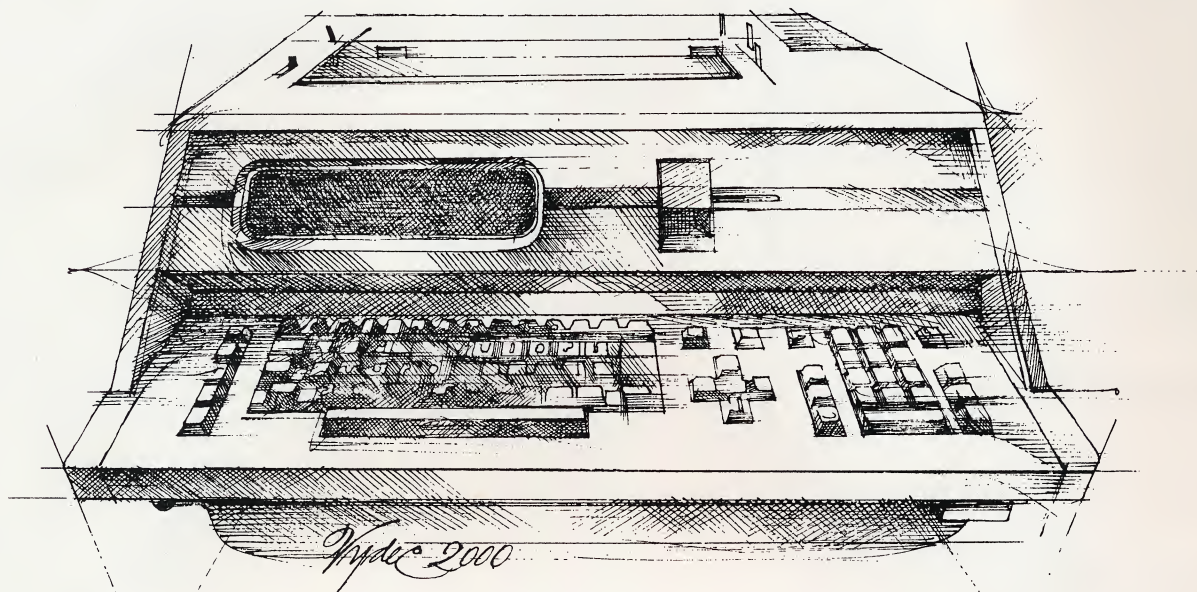
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Circle No. 4 — See Center Spread

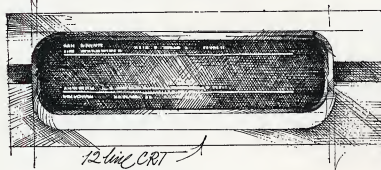


The new Vydec 2000 Word Processor-Communicator in theory.



The theory behind Vydec® 2000 represents a breakthrough in word processing-communications thinking and technology.

The Vydec 2000 is the first programmable word processing and communications system that combines a multiline CRT with the Vydec® Natural Language™ Keyboard, integral printer, removable disc storage and far-reaching communications capabilities all in one desktop unit.



Vydec 2000 CRT

Vydec 2000 features a 12-line CRT with 8-line text display that automatically performs input and formatting functions—including indentation, centering and decimal alignment. It also features an automatic document directory and 4 status lines that display the document name and page

number, the position of the cursor and information on "background" communications—for example, message arriving, message sending or document printing.

Vydec 2000 Integral Printer

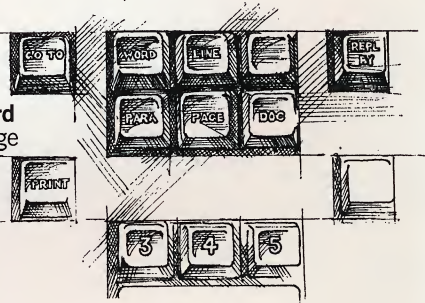
The 2000 features a built-in printer that lets operators print a page or an entire document in background while working on another in foreground. Paper edge sensing aligns forms perfectly. Proportional lettering assures a professional-looking document. Ragged justification stretches lines to eliminate hyphenation and produce a tight right margin. The Vydec printer even lets operators know

before printing whether the typestyle on

the daisywheel agrees with format instructions.

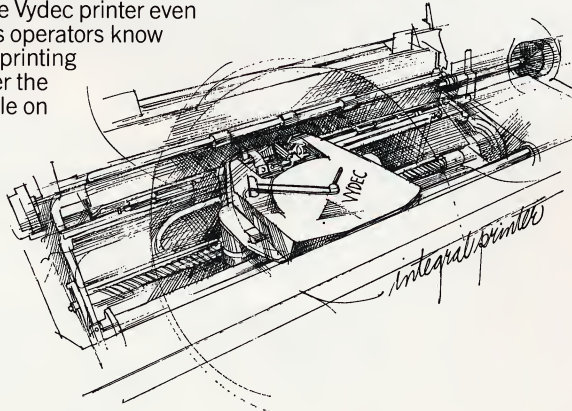
Vydec 2000 Natural Language Keyboard

The Vydec Natural Language Keyboard lets operators "talk" in natural language syntax, so editing is literally as simple as speaking. The keys shown here say "Go to document 3, print page 4."



Vydec 2000 Disc Storage

Because Vydec 2000 stores text automatically, operators can't forget a page or section. Format information is also embedded in each document so commands have to be typed only once.



Vydec 2000—Two Systems in One

From word processing to getting the word around... Vydec 2000 is truly two systems in one. It's a communications system that can serve as a "satellite" work station communicating with other Vydec 2000s. It can communicate with corporate and time-shared computers. It can function as a word processor-TELEX or word processor-TWX® terminal—editing, printing and sending messages directly, without rekeying.

Of course this is all fine in theory, but it's even better in fact.

Comp/Set systems offer you more, so you can offer more.

When you invest in a Comp/Set phototypesetter, you get more type-setting power for your money.

Because Comp/Set systems are designed to give you what you really need in a typesetter: high-quality type in a wide range of styles and sizes.

A model for every need.

You'll find a model that will fit your exact needs, and your budget.

With 70 on-line sizes, from 5½ to 74 points, there are models with four styles on-line, and others with 16 styles. Some models have output speed of about 20 lines per minute, while our 50-70 lines per minute

models meet the needs of higher volume shops.

And all models are available with record/playback capability.

Best of all, Comp/Set systems are easy to learn and easy to use. In fact, a typist can usually learn to set type in just one day.

You can choose the type styles you need from our library of over 400 styles, each of them available in many languages.

You can interchangeably use resin coated paper, stabilization paper, and even our new dry process. And we have automatic processors for each of them.

All Comp/Set systems are expandable. So as your business grows, just add economical off-line input terminals.

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All our systems are backed by our nationwide force of locally-based service technicians. So you get service when you need it, throughout the U.S. and Canada.

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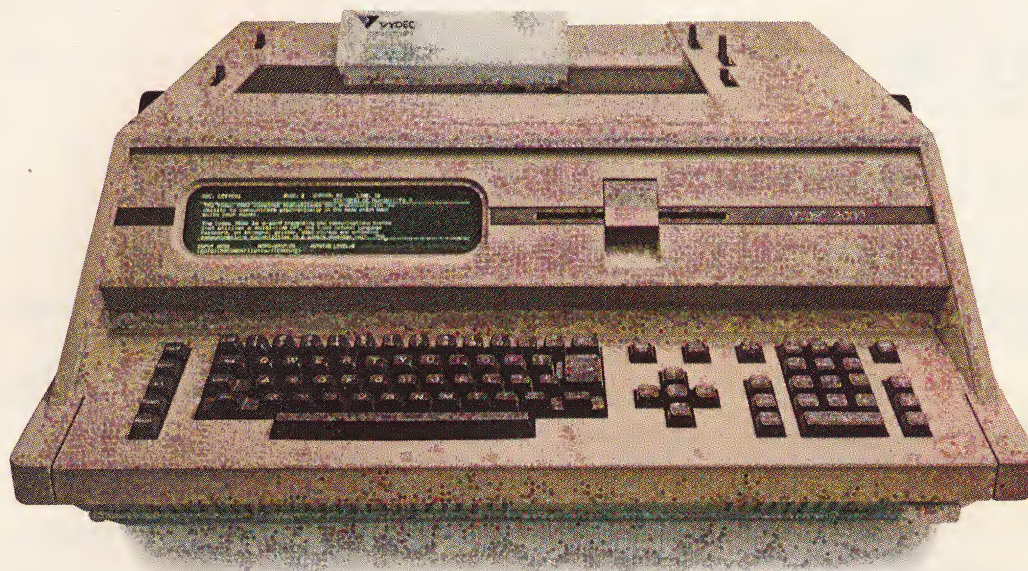


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Circle No. 1 — See Center Spread

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the Informationists.

The new Vydec 2000 Word Processor-Communicator in fact.



For further information, call toll-free 800-526-0662.
Or mail in the coupon below.

Please send me full information and specifications on the Vydec® 2000.

Name: _____

Company: _____

Address: _____

City: _____ State: _____ Zip: _____



Vydec, Inc., 9 Vreeland Rd., Florham Park, N. J., 07932

On Line

by Tim Moran, Associate Editor

With the IWP Spring Symposium in New York and the NCC Office Automation Conference in Atlanta falling within a week of one another, a number of manufacturers deemed it an appropriate time for product introductions: **Dictaphone Corp.** took advantage of both events to display two products — the 192-TDM Tone Dictation Module, designed for use with the Thought Tank System, which allows access to the system from any push-button phone, and the Thought Tank System 192/193 Dual Media transcribe station, which permits the transcription of either endless-loop or cassette dictation from one set of desktop controls. . . . **Hendrix Electronics** made use of both shows to demonstrate an underlining option for its Typereader 2. The option allows the OCR to recognize and process underlined copy produced in single space at 10 or 12 cpi. . . . The Smart Feed™ paper feeder, designed for use with any Qume printer, was **Lanier Business Products'** intro. The software-controlled, operator-selectable unit has two trays allowing either the vertical or horizontal feeding of paper. . . . **MicroPro International** had a new version of the WordStar® software package on hand, along with DataStar®, a WP data formatting package, and I/O Master, an output program and interface board. . . . **Aspen Ribbons** unveiled a new line of narrow-width spool computer ribbons and three HyType cartridge ribbons for WP printers. . . . A programmable IBM Mag Card converter — the TNI 202 — which enables the user to convert from mag cards to any major WP system, computer or typesetter, was introduced by **Telesystems Network**. . . . Two dot matrix printers (one 80-column and one 136-column), two daisywheels (one 25 cps and one 45 cps) and two floppy disk drives (one 5¼" and one 8") were **C. Itoh's** initially-OEM-only intros. . . . **American Word Processing** took the opportunity to show a low-cost fireproof safe for magnetic media, the Clean Air Machine, the Star acoustic modem and the Light Line electric copyholder. . . . And a WP cartridge ribbon for use on Diablo HyType I and other printers was **Graphic Ribbon's** introduction. . . . **Interactive Systems Corp.** featured its INtwx system which is a software module that connects its CRT text editor and electronic message system to the TELEX/TWX network.

These two systems shows were not the only things going on in the industry recently. **Dennison Manufacturing Co.** and the **Canadian Development Corp.** (CDC) announced that they have entered into an agreement to jointly develop advanced non-impact printers. The agreement also calls for their subsequent worldwide manufacture and sale. The first printer to be developed is expected to be a low-cost silent printer with an operating speed of approximately 50 pages per minute. "The first general applications for this technology," commented Dennison's president, Nelson S. Gifford, "will be in the development of computer output printers and printers for other office equipment, such as word processors." . . . Meanwhile, **3M** and **Thomson CSF**, a major French electronics company, have reached a tentative agreement giving 3M the worldwide distribution rights to a facsimile machine currently being developed by Thomson under a French government contract. The desktop unit, called "Thomfax," will conform to Group II and III CCITT standards. The target date for introduction of the product is early 1981. . . . Plans to give business-people-on-the-run a way to make copies anywhere are afoot at **Minolta Corp.** Though still in the research and development stage, an 8½"-long vest-pocket copier that looks like an oversize fountain pen is in the cards for the firm's future. The "mini-copier" incorporates fiber optics, photo receptors and encoding circuits. It picks up images from the page to be copied and transfers them through the optics to the photo receptors which change the images to electrical impulses. . . . Robert Howard thinks his firm's new product "could hasten the development of the office of the future, strengthen growth in electronic mail and streamline communications between multi-national corporations." Howard, president of **Centronics Data Computer Corp.**, was referring to the effect the firm's "Quietwriter" electronic typewriter could have on the business world. Presently in the prototype stage (units aren't expected to be ready for delivery until the early summer of 1981), the new typewriter technology is said to offer infinite electronic font flexibility, multi-copy capability, fully-formed characters and "silent" operation. The machine forms printed characters in a manner similar to human handwriting.

COMING EVENTS

April 16-24

Hanover Fair '80
Hanover, Germany
Contact: Schenkers International Forwarders, Inc.
One World Trade Center
Suite 1867
New York, NY 10048

April 21-25

NMA Exposition with Institute and Conference
New York Coliseum
New York, New York
Contact: John Bidwell
Expo Manager and Conference Director
National Micrographics Assoc.
8719 Colesville Road
Silver Spring, MD 20910
(301) 587-8202

April 28-30

Federal DP Expo
Sheraton Washington Hotel
Washington, DC
Contact: Peter B. Young
Interface Group
160 Speen Street
Framingham, MA 01701
(617) 879-4502, or
(800) 225-4620

April 29-30

"1980 Symposium and Exhibition:"
Word Processing and Automated Office Systems
Leamington Hotel
Minneapolis, Minnesota
Contact: Laurie Keen
6CN168
First National Bank of Minneapolis
120 South Sixth Street
Minneapolis, MN 55480
(612) 370-4350

May 6-8

Paris, France
Micro Expo '80
Centre International de Paris
Contact: Robert Maraziti
U.S.A. Show Coordinator
Sybex, Inc.
2344 Sixth Street
Berkeley, CA 94710
(415) 848-8233

Corporate Systems

TECHNOLOGY
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C O N T E N T S

6 Profile: Communications in the Eighties

18 Implementation of text editing and photocomposition equipment — complemented by OCR input — enabled Kidder Peabody to chop \$75,000 off composition costs in 1979.

23 Great Northern Paper communicates production and order information to its mills quickly and accurately — and at a reasonable cost — with a high speed digital fax network.

37 Controlled by access and authorization codes, Dunhill's private phone system provides full call accountability and has cut long distance costs by 30 percent.

39 National Airlines upgraded its tape and disk drives to handle the rapid access and heavy storage needs of its on-line reservation system.

43 Using a centralized loop dictation system and display text editors, the University of Colorado Health Sciences Center has sharply cut document turnaround time.

47 The use of high speed electronic sorting machines and a Unique ZIP Code has helped Colonial Penn improve turnaround time on customer mail.

53 Offering operators the flexibility to update prescriptions on the spot, dual disk display text editors cut drug wastage in half at the Pharmaceutical Service of Holy Cross Hospital.

55 At the Trust Company of New Jersey, a non-impact printer is turning out 600,000 pages a month at a speed that is eight times faster than the company's former printing system.

57 New Technology

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COVER & PROFILE PHOTOS
BY STEVE SINT

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Official subscription form may be obtained by submitting your request on company letterhead. Single copy price to others: \$1.00. **VBPA**

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high-level developmental languages, including BASIC, COBOL and Assembler.

In an information resource management environment, the unit combines disk storage and processing capability with its ability to communicate with remote mainframes using any of the available protocol options. It can be utilized for local data collection, concentration and communications, and is field upgradeable.

"Ultimately," noted Roberts, "communications, office and data systems will combine at the information station. The multi-function, multi-protocol computing terminal approach typified by the 4500 Series is the only approach relevant to the '80s." For more information on this system, call Dan Seale at (408) 286-4200, or circle 101.

Tech Specs

ESC Microsystems' 4500 Series is built around a Z-80 microprocessor with 158 instructions, local disk storage and 64K of addressable memory with bank switching capacity to 256K. Its display measures 80 columns x 25 lines, and the keyboard features editing, numeric and special function keys. Communications include RS232C synchronous or asynchronous, 75-19200 baud selectable, full modem controls and the major mainframe and mini protocol options. Two disk drives with 983Kb storage are standard. The price for a typical configuration is \$6100 per unit, when purchased in a quantity of 20.

Communications terminal handles range of protocols and supports four channels of fax compression

Addressing itself directly to the growing trend to enhance word processing capabilities with powerful and multi-compatible communications capabilities, **Compression Labs** has begun marketing the CLI-441 Advanced Communications Terminal. The unit allows users to send, receive and/or manipulate a wide range of text — or data — on a single CRT terminal, which automatically handles the reception, transmission, translation and refiling of TWX, Telex, DDD, 83B3, as well as other facsimile-formatted communications.

The CLI-441 can support up to four channels of facsimile compression, including FM analog, AM analog or digital fax. It also offers a store-and-forward capability allowing input from, as well as output to, remote facsimile terminals to be translated, gathered and then reviewed or sent at the most economically feasible time.

In addition, the terminal can translate character-oriented input to facsimile-compatible output; an attractive feature, the company stressed, to users interested in establishing an electronic mail network, as it enables currently installed facsimile equipment to be used as electronic mail terminals. The system also features four separate channels that offer the user an

almost limitless flexibility of configuration in integrating existing communications equipment to fill future requirements.

A word processing package, available with the CLI-441, allows users to manipulate text simultaneously as communications are taking place.

The system comes equipped with dual floppy disk drives, but a paper tape punch and reader are also available as options. The CLI-441 will also support an additional CRT terminal, and a choice of printers — matrix and letter-quality — is offered.

For more information on the CLI-441, call Andrea Wald at (408) 725-0202, or circle 107.

Tech Specs

The CLI-441 can handle a full range of character-oriented communications protocols, including TWX, Telex, DDD (TTY), 83B3 and 2780 Bi-Sync. The FM analog fax compressions that the CLI-441 can accept include U.S. Group I, Xerox 400/410 and Qwip 1200; the AM analog compressions include CCITT Group II, Qwip Two and Panafax MU-1200. The standard dual floppy disk drives provide 600,000 characters of storage, which may be expanded to over 20 million characters.

The SELECTRONIC System 810

It lets you file records randomly... retrieve records automatically.

It pays for itself in a matter of months through increased productivity with fewer personnel.



You're looking at the amazing Selectronic System 810. Now you can get your information instantly instead of going through the error-prone, costly and cumbersome method of searching, finding and returning.

You just index the information on the Console and the desired material "pops out." And there is no need to return records alphabetically, numerically or whatever sequential system you use. Just return them at random. You can't misfile; you can't lose records.

Selectronic 810 can retrieve one record or a group of records simultaneously in seconds, whether on cards or on film. There are scores of means you can use for obtaining a wide range of information for statistical purposes. As many as 2000 documents, including fiche, can be stored, with additional add-on capacity to meet your growing needs.

And because the costly and cumbersome multi-step searching, finding and returning are eliminated, the Selectronic 810 pays for itself in a matter of months through increased productivity with fewer personnel.

Selectronic 810 is an engineering marvel with a brain. But we've priced it with a heart. Write for literature describing Selectronic 810. It amazes everyone. Even us.



JEFSTEEL BUSINESS EQUIPMENT CORP. / 1345 Halsey St., Brooklyn, N.Y. 11227

Circle 18



Higher COM Film Resolution Starts With HUNT Micrographic Chemistry

Because chemistry plays a key role in achieving optimum character definition and resolution, it's important to know more about Hunt. You'll find a company involved in the production of image-making chemistries for 70 years; with in-depth research and manufacturing facilities, and quality control procedures that assure product uniformity.

Hunt Micrographic Chemistry maintains the high resolution of COM films to help you meet the critical demands of greater image reduction.

Hunt Micrographic Chemistry is a universal system for use with all major brands of film. This easy-to-handle, all-liquid system is the cleanest-working chemistry of its kind (special buffering agents prevent chemical build-up on rollers and dirt on film).

For processing microfilm in rapid access machines, Hunt now offers you its new Micro-Star Developer.

Keep your resolution. Contact us for the name of your nearest Hunt dealer and your copy of this informative brochure.



HUNT CHEMICAL

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Circle No. 8 — See Center Spread



New Technology

(Continued)

Digital phototypesetter uses scanning process to produce copy without photo unit or image carrier

Striving to attain better quality, faster speed, greater flexibility and more convenience in the phototypesetting process, **Compugraphic Corp.** has announced the CG 8600, a digitized phototypesetter that requires no photo unit or lens and does not contain an image carrier. The 8600 digitizes rather than photographs characters, which, the company explains, can be thought of as sorting data in a computer rather than a process requiring making a physical image of characters on a piece of film.

The digital information about characters to be typeset is obtained from a scanning process. Characters so scanned are then drawn to a machine master character which can range in size to 64 points.

Unlike conventional phototypesetting systems that expose an entire character with a single flash of light, digital phototypesetting exposes characters by overlapping stroke after stroke for uniformity.

Depending on the number of lines per inch used for a matrix, character resolution can be optimized; the 8600, for ex-

ample, uses a 1300 lpi matrix at 64 point master size. This allows a high resolution screen and a large enough character master to eliminate, the company claims, sawtoothed and vectorized edges.

The 8600 can typeset 650 lines of eight point type on a standard newspaper column width in a minute. A conventional phototypesetting system, says the firm, can set approximately 50 in the same time frame.

The flexibility inherent in a digital typesetting operation, according to Compugraphic, is also considerable. For instance, the 8600 can set all characters in sizes from four to 72 point (up to 118 point for capital letters and characters without descenders), and these type sizes can be increased in half point increments. The 8600 can line space in one-eighth point increments and has reverse leading capabilities of up to 24 inches. The unit can also modify the information supplied to it for any one character to create some special effects: Letter-forms can be condensed or expanded, pseudo-italicized at a 12-degree slant or reversed to provide a white character on a black background.

Finally, digital phototypesetting is convenient, says Compugraphic. Each typeface available for the 8600 is purchased in the form of digitized information recorded on a Typographic Data Disk (TDD). The initial disk — or primary TDD — purchased contains all the basic characters of the typeface. Additional disks, supplementary TDDs, can also be purchased, which contain supplementary characters or complements. By a careful

selection of TDDs, Compugraphic pointed out, users can tailor type selection to individual needs. After the information on the disk has been input into the typesetter's computer memory (which can hold approximately 100 faces on-line simultaneously), it becomes part of the typesetting system.

For more information on the 8600, call L. Van DaLinda at (617) 944-6555, ext. 2884, or circle 104.

Tech Specs

The CG 8600 is available in two models: one with a 45-pica line length capability and the other with 68 picas; the former model is upgradeable to the latter.

The digitized font library available includes over 300 typefaces, and new digitized fonts are being added at the rate of 20 per month.

The unit has two input ports, allowing it to accept data from two compatible sources. It may also serve as an output device for the firm's Quadex front-end system, the AdVantage, the UTS (Unified Terminal System) and the MDT 350 (Mini-Disk Terminal). In addition, the company makes interface data available to all industry front-end system manufacturers.

The 45-pica unit is priced at \$45,500, while the 68-pica model is offered at \$55,500.

Multi-function computing terminal interfaces with major mainframes, as well as most minicomputers

According to Michael Roberts, president of **ECS Microsystems**, during the next few years, millions of computer terminals will dot the office landscape, all of them tying into tens of thousands of interconnected terminals in hundreds of different networks.

In an effort to provide the needed link between the widely dispersed equipment and data bases, ECS has introduced the 4500 Series multi-function, multi-protocol computing terminal. The unit is an information resource management terminal designed for distributive information networks and standalone computing.

Unlike the data processing function terminals of the '70s, the 4500 supports all major U.S. mainframe protocols — including Sperry Univac, ICL, IBM, Burroughs, Honeywell, Hewlett-Packard, NCR and DEC — as well as those of most minicomputers.

The unit combines the "features of an advanced intelligent terminal with the benefits of a desktop data processing system." This combination is offered as a solution to a range of business and communications problems, such as standalone processing, distributive processing (functional and hierarchical), network operation (ring, star and string) and point-to-point communications.

As a standalone system, the 4500 is supported with a variety of both developmental and applications software. Ready-to-use business and word processing packages are also available, as are several

solve five

Problem	Solution
Tardiness	Flexible Work Hours
Absenteeism	Flexible Work Hours
Personnel Turnover	Flexible Work Hours
Erosion of the Workday	Flexible Work Hours
Poor Morale	Flexible Work Hours

Solve these problems, and you will see the results in increased productivity and overall profits.

As the innovators in the application of Flexible Work Hours, we have improved the workhabits of thousands of employees in hundreds of companies in the United States alone.

Our FLEXTIME® system can easily be implemented within your company. Please write or call for our case histories and additional information.



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Profile: Communications in the Eighties

BY EILEEN TUNISON, EDITOR



Video teleconferencing provides U.S. firms with an alternative to business-meeting travel

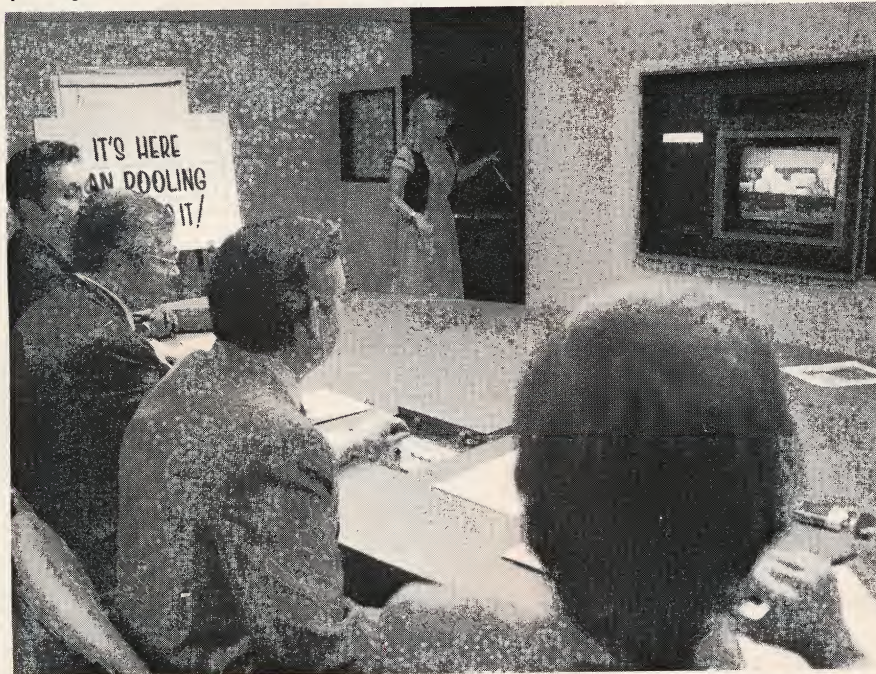
Keep you on time . . . increase your effectiveness . . . and save you the time and cost of travel, that's what AT&T thinks its Picturephone® Meeting Service (PMS) can do. The service, which is currently available in 12 cities on a market trial basis, allows the customer to hold a meeting between any two of the locations currently equipped with a PMS center.

An advance reservation made at the center nearest the customer holds a PMS room for a specific date and time. According to the firm, everything is automatic, and on-hand room attendants instruct the participants in the use of the facilities. The

president of Ford Aerospace, at the initial PMS demonstration. "The facility gives us a practical alternative to having a manager spend a full day or more of travel time away from his job just getting there and back."

The basic PMS fee grants customers the use of centers in each city, equipment for visual aids — including slides, transparencies and videotape — and the capability of making or sending "hard copies" of pictures seen on the monitor.

Participants see and hear each other by means of video monitors mounted on the wall in front of each conference table. Voice-activated cameras automatically shift to the active speaker, and a separate camera presents an overview of the group when its members are listening to the speakers at the other location.



meeting itself, however, is private, as no user-assistance is necessary once the communications lines are up and running.

Dallas, Texas, is the site of the newest trial PMS center. "PMS meetings can be conducted efficiently and effectively while saving the cost of travel, the energy needed for travel and, perhaps the business person's most valued commodity, time," noted Kenneth W. Fancher, vice president of Southwestern Bell in Texas.

"Virtually every aspect of in-person meetings, which may require a day or more away from the office, can be duplicated with PMS in just the time it takes to conduct the meeting," he said.

The Bell vp went on to state that, with spiralling inflation and energy conservation foremost in everyone's mind, the meeting service provides the public with an alternative to business travel.

Another installation has been implemented by Ford Aerospace & Communications Corp. at its Renaissance Center in Detroit, Michigan. The firm is the first U.S. industrial company to establish its own center.

"With our new facility, two groups can accomplish as much as could have been done by having to fly people across the country," remarked Henry E. Hockeimer,

The system permits transmission of pre-recorded video tapes, 35mm slides or Vugraph presentations, documents or flip-charts, and the entire meeting can be recorded on videotape as it progresses.

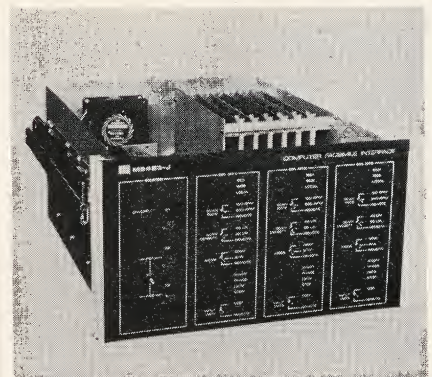
Prices for the PMS service range from \$2.50 to \$6.50 per minute and from \$150 to \$390 per hour.

For more information on this service, call Marge D'Amico at (212) 393-6413, or circle 106.

Computer-to-fax/fax-to-computer interface will enable analog users to send and receive digital info

Seeking to increase the compatibility — and usability — of the many analog facsimile devices now only capable of sending and receiving messages to and from like machines, Muirhead's Data Communications Division has introduced the Computer Facsimile Interface (CFI).

The unit, the company states, enables analog fax users to send information to and receive information from computers. In addition, it will permit these machines to communicate with other types of previously incompatible fax equipment.



Basically, the CFI converts analog to digital signals and digital signals back to analog. According to the firm, this will make it possible to use a standard fax receiver or transmitter as a low-cost, on-site or remote computer terminal offering hard-copy, gray-scale reproductions.

"It's something that was badly needed," said Doug Linsley, Muirhead's marketing manager. "Now, practically any existing fax terminal can become an integral part of a larger operating system, be it a data processing, word processing, general or specific system."

"Most of the facsimile installations around today are analog. Unfortunately, virtually all DP and WP systems are digitally controlled. Bridging this gap will soon become increasingly important to users as a way of improving the compatibility within, as well as among, their already-installed information processing systems. The key to systems success in the future will be compatibility," stated Linsley.

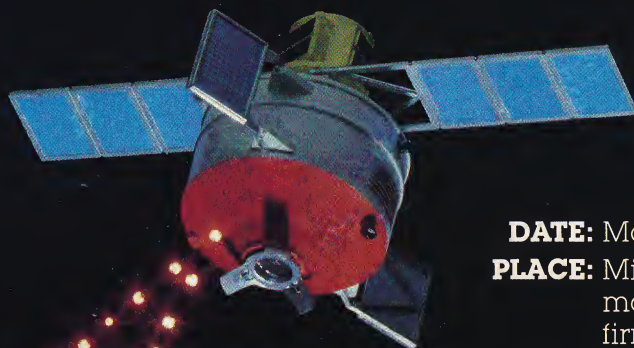
The CFI compensates for differences between input and output rates by using a synchronous sequencer, which allows for the necessary blanking at the end of each scan line. It also provides for the correct insertion of scanning rate, density and stop command signals. The baseband analog data stream from the CFI modulates a carrier before line transmission to the recorder.

Suggested applications include satellite image transmission, data storage and retrieval, alphanumeric computer processing and computer graphics manipulation. For more information on the CFI, call Doug Linsley at (201) 233-6010, or circle 102.

Tech Specs

The Computer Facsimile Interface functions in three basic configurations: within message switching environments (such as private lines and over common carriers); within established word processing networks (located either within a single corporate location or at different locations); and within a specialized operation (such as weather map transmissions, which can be formulated by a computer and then output by a CFI-equipped facsimile terminal).

The price of the CFI ranges from \$3000 to \$25,000, depending on configuration and the network on which the interface is used.



DATE: Monday, March 11, 1985

PLACE: Mini office of a multi-national manufacturing company. (The firm is headquartered in New York City, but the mini office is located in a New Jersey suburb 60 miles away. This mini office is one of hundreds scattered throughout the world, allowing the firm's employees to work close to home.)

TIME: 9 a.m.

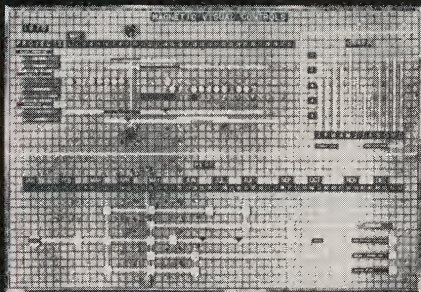
Jason York enters his office, sits at his workstation and asks his terminal for any urgent messages that have come in overnight. The terminal searches its memory and responds in a pleasant, albeit computer-simulated, voice: "Mr. York, the only urgent message came in from Kathy Linden in Tokyo over the electronic mail [EM] system. She requests a video teleconference with you and Ted Greene so that she can show you the designs for the new copier. Do you need a hard copy?"

York says he doesn't need a copy, then dictates a message to Ted Greene at corporate headquarters in New York City and Kathy Linden in Tokyo, setting up a time for the three-way video conference. He instructs the terminal to give the message a priority code so that it will go out on the EM system immediately.

While waiting for a reply to his memos, York holds a video conference with the marketing people at headquarters to discuss a new promotion campaign, then requests the terminal to display the full text of a 12-page production report that came in over the EM system that morning. He instructs the terminal to send certain sections of the report to each of the 10 district managers, and dictates individual messages relating to each manager's production costs.

A busy, but typical, morning for Jason York.

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The most modern and flexible board available today.

Here's an "efficiency expert" that works 24 hours a day — never takes a coffee break. Spotlights instantly the progress of every operation—pinpoints up-coming trouble spots... alerts you to errors. Colorful magnetic indicators move with finger-tip ease to schedule sales, production, personnel, traffic or any operation that requires paper work. Ideal also for EDP equipment, PERT and flow charting. No cards, pegs or other nuisance devices to replace because magnets last indefinitely. Pays for itself in time and money it saves.

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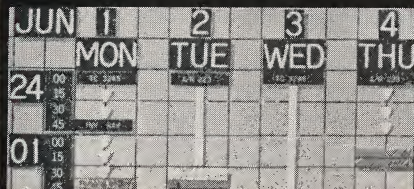


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Circle 16

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Circle 17

New Technology

(Continued)

Information processing system handles WP, DP, records storage; communications network featured

The driving force behind Xerox Corp.'s recently introduced 860 Information Processing System was, according to the firm, the desire to provide users with extended capabilities that would enable them to do text editing while simultaneously processing business records and data on the same system.

In view of this, Xerox feels the 860 system has achieved what it set out to accomplish. Comprising a full page display unit, a keyboard, printer and controller, the 860 features five optional disk storage configurations able to hold a maximum of 4800 pages of material. Optional software packages for the system include programs for records processing, system activity recording and a BASIC language interpreter, allowing the use of business applications programs.

As a complement to the 860 system, Xerox concurrently announced Ethernet, an office communications network, which is an essential element because it permits all components to work together as an effective system. Essentially, Ethernet is a passive communications medium, with no switching logic. It is not controlled by a central computer; rather, it accepts transmissions from attached system elements. Ethernet performs the function of enabling elements in an office environment — such as workstations, printers or disk files — to exchange information. Information is transferred in "packets," which include the data to be sent, the address of the unit that will receive it and the address of the unit sending it. Each transceiver monitors the network before transmission to be sure it

is clear and during the transmission to detect interference.

The 860 is completely compatible with Xerox's word processing system. A user of the Xerox 850 page display typing system, for example, can get the 860's extended capability by trading system controller units.

For more information on the 860 and Ethernet, call Bill Rolph at (213) 679-4511 ext. 7187, or circle 103.

Tech Specs

The basic 860 configuration includes a full page display unit, a shared-printer interface, automatic paper feeder and a standard printer unit. The system is disk compatible.

The base system includes:

- a microprocessor that features two single-sided floppy disks, each storing 300,000 characters, and 96K RAM, expandable to 128K (programs are loaded from a systems software disk which is then removed);
- a display that shows 66 lines of 102 characters each;
- a keyboard with 45 function keys and supplementary cursor control;
- and a bidirectional, 35 cps printer that uses metal-clad daisywheels and features 10 pitch, 12 pitch and proportional spacing.

Among the 860 options: a number of disk drives, including double-sided floppy (storing 288 pages); a double-sided dual-density floppy (576 pages); five megabyte fixed (2100 pages) and 10 megabyte fixed (4200 pages); a wide carriage printer; a number of communications variables, including point-to-point (for Xerox 850 and 860), 2770 emulation (to IBM OS/6, 6640, MC11 and computers) and 2780 emulation for batch communications and teletype; a shared-printer interface; and an automatic paper feeder. Purchase price for a base 860 system is \$15,300, and, on a one-year lease, monthly rental is \$650. A variety of additional pricing plans is also available.



CORPORATE SYSTEMS

Science fiction? Today, yes. But, industry experts predict that this situation — or one very similar to it — will become a way of life before the end of this decade. Right now, systems that are so revolutionary that they will change the face of American business are in the planning and development stages.

Before these changes can take place, all the elements have to be in place. The one element that forms the basis upon which all other advanced information systems will be built is communications. For Jason York's experience to become a common reality, we need sophisticated, reliable and efficient communications systems that combine all forms of communications — voice, data, text and images — at a cost that is affordable by most businesses.

How many steps have we taken toward this goal? How far do we still have to go? How long will it take us to get there, and what will it be like when we finally arrive? These are some of the questions CORPORATE SYSTEMS asked the leaders in the communications industry. Their answers are knowledgeable, intriguing and informative.

A decade of change

Before predicting where the communications industry is headed, these industry experts explained where the industry is today and discussed the major developments that have been responsible for recent advances and changes.

The last decade was a period of change for the communications industry, which had been relatively static compared to its sister industry, data processing. This situation changed dramatically in the seventies. One of the main catalysts of this change was the business community itself, which came to recognize and vocalize the need for efficient and economical communications systems.

"The reasons for this focus on improving office communications were many and varied," stated Gary Winkler, director of product marketing at Rapicom. "They included the energy crisis of the early 1970s, the low productivity of office personnel, the deterioration and rising costs of tra-

ditional document communication methods such as the mail, and the continuing introduction of new technologies and communications services at lower and lower costs, which made the implementation of these new technologies both practical and affordable."

"However, it is not the emergence of these new technologies that I see as the most significant change in the past five years," Winkler continued. "Rather, it is the growing consensus and realization that better, more efficient communications and communication methods are required. It is this realization and need that have

The last decade was a period of change for the communications industry. . . . One of the main catalysts of this change was the business community itself, which came to recognize and vocalize the need for efficient and economical communications systems.

created the diverse technological menu now confronting today's MIS, communications and office manager."

Environment fosters competition

Another major force responsible for the changes that have taken place in the communications industry is the regulatory environment, which has fostered a tremendous increase in competition.

"The shift in regulatory policy has permitted the development of true competition within the communications field," affirmed Brig. Gen. H. R. Johnson, USAF (RET.), the vice president of marketing for American Satellite. "As recently as 10 years ago, AT&T and Western Union had a total monopoly on voice and message communications within the United States.

"Today, the industry structure has changed to the point where there is a wide range of choices available from competing carriers, providing the user with potential to design specialized networks that are carefully tailored to his requirements."

Robert Smith, vice president, sales and marketing for ITT Terryphone, agreed: "The regulatory environment has resulted in the advent of new FCC licensed common carriers — MCI, Execunet, Telenet, ITT USTS and CCS, etc. — as alternatives to the public network offerings such as WATS."

This increased competition has resulted in some significant advantages for communications users. "The emergence of competition for private line circuits has resulted in a dramatic decrease in the cost of such services — both from AT&T and the specialized common carriers," reported Richard Doelger, Jr., regional general manager of TDX Systems.

"The so-called 'Execunet' decision has probably had the most profound effect upon both the specialized common carriers and the enormous market that we call the small business, long distance user," he continued. "Essentially, this decision permitted carriers to use their existing private line facilities to handle long distance traffic to the major domestic cities served by the network on a dial-up basis at dramatically lower rates.

"This marked the first competitive invasion into the very profitable direct dial, long distance market that had previously been the exclusive purview of AT&T. For the first time, the 'small guy' was offered a way to cut his phone expenses."

In addition to increasing competition, these decisions — which the courts have confirmed — have forced the industry's suppliers to acknowledge the fact that competition is going to be a way of life in the communications industry, according to William McGowan, MCI board chairman. "The increased competition and the introduction of technologically advanced equipment and services have also made the communications customer realize that he needs to be a much more sophisticated buyer."

Technological advances

There seems little doubt that the regulatory environment and the subsequent increase in competition have had an enormous impact on the communications industry and have been

New Technology

THE LATEST SYSTEMS
ADVANCES IN THE
DATA PROCESSING,
WORD PROCESSING,
COMMUNICATIONS
AND RECORDS
MANAGEMENT
INDUSTRIES



Multi-function terminal handles word & data processing plus electronic mail functions

A number of enhancements that will permit users to perform word processing, data processing and electronic mail functions on the same terminal have been added to **Datapoint Corp.**'s existing product line.

"We think these are significant product introductions," said Harold O'Kelley, the firm's president. "Our new Electronic Message System — EMS — prioritizes messages and verifies delivery; the WP capability offers text processing and the storage/retrieval of documents at will; and LightLink™ allows the transmission of data between nearby locations — without cables — at the speed of light."

Among the features offered by EMS are flexible priorities, encryption, verification of delivery and acknowledgement of receipt options, full management and accounting reports and the ability to efficiently transmit messages within a building, between nearby buildings and to remote sites.

"Our goal," said Dan Hosage, senior vice president of Datapoint's office products division, "is the integration by computer of all office functions, thus providing a wide line of compatible and modular hardware and sophisticated software."

In line with this, EMS was designed to be utilized on a standalone basis or as part of a larger integrated system that could include the firm's data processing, word processing and voice communications products.

Specifically, in addition to being compatible with the company's Attached Resource Computer™ (ARC) System, EMS can also interface Datapoint's INFO-SWITCH™ Long Distance Control System (LDCS) and other industry standard terminals, such as Telex or TWX.

Hosage pointed out that EMS is a powerful system in and of itself, but when used in conjunction with the firm's other products, its value and efficiency grow exponentially. "We feel the true value of EMS rests on the degree of control that it provides a company," Hosage said.

Also featured on the EMS system is a reporting capability that provides both management and accounting reports on all message activity.

The firm's word processing package, with which EMS can be used, is a comprehensive system of hardware and software integrated for document preparation, revision, printing, filing and retrieval.

In particular, the word processing system offers a function called the Associative Index Method (AIM), which allows the rapid retrieval of information. The search can be based on words, partial words, dates or phrases.

Finally, Datapoint is offering a communications link which can tie EMS, ARC, and the word processing system together. Called LightLink, this communications medium uses modulated noncoherent infrared light for short-distance transmission. LightLink acts as an extension of the interprocessor bus (coaxial cable linking processors) and allows users to transmit digitized information between ARC systems up to two miles apart.

Citing the fact that it is often more difficult to achieve communication between buildings within an office park than it is to transmit information across the country, Hosage explained that LightLink solves this communications problem with its method of transmission. "No registration or licensing is required," Hosage stated, "and the need for laying cable or utilizing standard voice lines is eliminated."

For more information on any of the enhancements, call Gerry Cullen at (512) 699-7000, or circle 105.

Tech Specs

The basic components of the Electronic Message System include: a 6600 Series advanced processor, which acts as the electronic network controller, dedicated disk storage and a printer. Users of the system would typically use Datapoint 3800 processors for message generation while employing 1500 and 1800 processors suitable at remote sites.

The 45 cps printer designed for use with EMS features letter-quality print, platen drive with top loaded single sheet operation, or bottom loaded fanfold forms with optional stand and tractor feed, interchangeable daisy printwheel and a choice of a serial or parallel interface.

The Datapoint word processing system works on Datapoint 3800, 1800 and 1500 Series processors. Screen size is 24 by 80 characters, and it uses the Associative Index Method (AIM) file for rapid random access by content alone to any member document. The word processing system is compatible with the company's disk operating system (DOS-DOS.D, DOS.G, DOS.H) diskette, cartridge and mass storage disk drives. The WP system works with Datapoint's Dispersed Data Processing and Electronic Message System either in the Attached Resource Computer System or in a standalone environment.

LightLink can send and receive information at data rates of 2.5 million bits per second.

responsible for many of the technological advances that have taken place in the industry in the last several years.

These advances have been significant, according to Robert Siegler, vice president of sales for Panafax. "The last five years have seen the emergence of dramatic advances ranging from the high visibility of private interconnect companies—offering voice/data/message switching private telephone systems, as well as packet and networking communications systems—to the microwave global communications carriers," he stated.

Owen McBride, marketing manager for facsimile products at 3M, believes the most significant technical advance has been "the movement from copper cable to satellites, earth stations and intelligent transmission systems with much improved price performance."

"The growth of the satellite industry has had a tremendous impact on business," agreed John Fox, vice president of marketing at Western Union. "It provides long distance voice and data communications services at rates that are substantially less than terrestrial services."

In the facsimile area, the greatest advance was the introduction of digital fax. "Digital facsimile machines utilize data compression techniques to transmit information many times faster than any analog system," explained Dal Berry, general manager of Burroughs' Office Automation Division. "Digital technology also permits the addition of many convenience features and opens the door for a variety of interfaces to other types of office equipment. In fact, digital fax has the potential for acting as an input-output device for a non-paper information storage and retrieval system."

The telephone instrument itself has also become much more sophisticated during the last several years. "For over 30 years, the phone had not really changed," stated Harvey Hellering, vice president of marketing and sales for Executone. "There were changes in color and shape, of course, but it was basically the same old phone."

According to Hellering, the real change came about four years ago when the proprietary phone—a phone designed specifically for the system to which it is connected—was introduced.

"Before proprietary phones, customers were stuck with a rotary or pushbutton instrument that simply could not match their new switching equipment," he explained. "The customer had this marvelous switch with outstanding capabilities, but he was trying to tell it what to do with a phone that was really designed to do nothing more than reach the person at the switchboard."

Many of the new features available on today's phone are the result of microprocessor technology. "Silicon chips and solid state circuitry have greatly improved phone capability and reliability," Hellering continued. "Without the new chips, a big wad of circuitry would have been necessary to provide these new features, and that would have increased the cost of the system."

As far as John Cochran, president of Qwip Systems, is concerned, the most important development in the field of image communications during the last five years was "the introduction of new products that systematically integrate data processing, word processing and image communications functions. These new devices are a prelude to the new multi-functional products that will abound in the office of the future."



The Qwip Two facsimile unit

Dan Hosage, senior vice president of the Office Products Division of Datapoint Corp., agreed with this assessment. "The most dramatic change has been the rapid integration or merging of office functions," he declared. "In 1975, voice, data and message services were all distinct, separate disciplines that were frequently administered by different individuals within a corporation."

"Within the last five years, we've seen a merger of first voice and data, and then, in rapid succession, the integration of electronic message and word processing functions. The economies and efficiencies apparent in this increased integration dictate that further advances in this area will be aggressively pursued in the short term."

Microprocessor & digital technology

The experts seem to agree that many of the communications advances that have been made during the last five years are based on the application of microprocessor and digital technology.

"The application of multi-plexed, microprocessor-controlled technology to telephone systems and networks has permitted a wave of new user-oriented features at economical prices," reported Smith of ITT Terryphone. "The availability of microprocessors and the advances in microprocessor technology have speeded the transition from electro-mechanic to electronic and, ultimately, to computer-controlled private phone systems. Software technology and its application have penetrated the telephone industry much as they did the computer industry."

The availability of very large scale integrated (VLSI) circuits and the application of this technology to produce low cost microprocessor systems have made it possible to incorporate a high level of intelligence into communications networks and terminal equipment, according to American Satellite's Johnson.

"This intelligence makes them flexible and highly responsive to user requirements," he remarked. "The microprocessor is finding application on every front: privacy protection through cryptographic systems; low

take a second look at the system. I liked what I saw and decided to lease the system, with installation set for December 1977.

We selected the PPS unit over other equipment because it prints an original document on standard size paper, which is more versatile and easier to store than computer printout. And, with standard size paper, waste averages less than two percent. The use of standard paper also allows us to print time deposit statements, checking account statements, trial balance sheets and numerous internal reports without the need for messy printout carbons.

The system's print speed — 8000 lines a minute — was another deciding factor, as was the PPS's magnetic computer tape, which is compatible with equipment from several computer vendors, including IBM, Univac, Burroughs and Honeywell mainframes. Our principal computers are two Burroughs 3700s.

Since the PPS is a standalone system, it frees our Burroughs computers for other jobs. Previously when the mainframes were used with impact printers, the printing process occupied 20 percent of the computers' time.

The system's flexibility has also been helpful. For instance, if we want to perforate a page or punch holes in it for ring binder storage, we

simply key this information into the PPS. In addition, although we make only blue and white copies, black and other toner colors are available.

Result:

Today, we use the PPS to produce about 600,000 pages a month, of which 70,000 are demand deposit statements and 50,000 are trial balance sheets. Before we started using this system, checking account statements had to be burst and decollated before they were sent to bookkeeping for stuffing with cancelled checks. Now the statements come off the PPS precut to the proper size, which means they can go directly to bookkeeping — shaving two to three hours off the process.

When we used an impact printer, we had to keep a file copy of all reports. Now, the PPS magnetic tape print files are in the format required for computer output microfilm (COM), so we send the tape to a COM service bureau where it is shot onto microfiche for compact storage.

Once the reports are on microfiche, we merely recycle the magnetic tape for other jobs. This alleviates the need to print hard copies from the magnetic tape.

The filmed material is much easier to file and store, and the use of microfiche has cut back tremendously on

the amount of space needed to store these documents. It has also eliminated the need to shred reports that are no longer required.

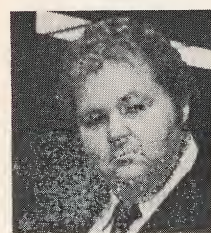
Currently, we use on-line terminals in all of our branch offices to handle transactions and inquiries during the day. When the system goes off-line at night, we prepare printer backup tapes containing the day's transactions and then print these reports on the PPS. The speed and efficiency of the system has helped us reduce our shifts from three to two-and-a-half.

Even more important is the fact that internal information — including mortgage and loan reports — that is entered into the system on one day is in the hands of bank officials the following morning. In addition, every page is now an original. With our old impact printing operation, there were one or more carbons. The top page was legible, but the carbon copies often were difficult to make out. That problem is behind us now.

More recently, we have begun producing stock transfer notices and statements for the issuance of new stock certificates for the large corporate trust department. With the development of a heavy-weight paper by Crown Zellerbach, we may soon be producing shareholders' proxy statements on our PPS. We also hope to expand the system's use to other customer applications in the future. ⊕



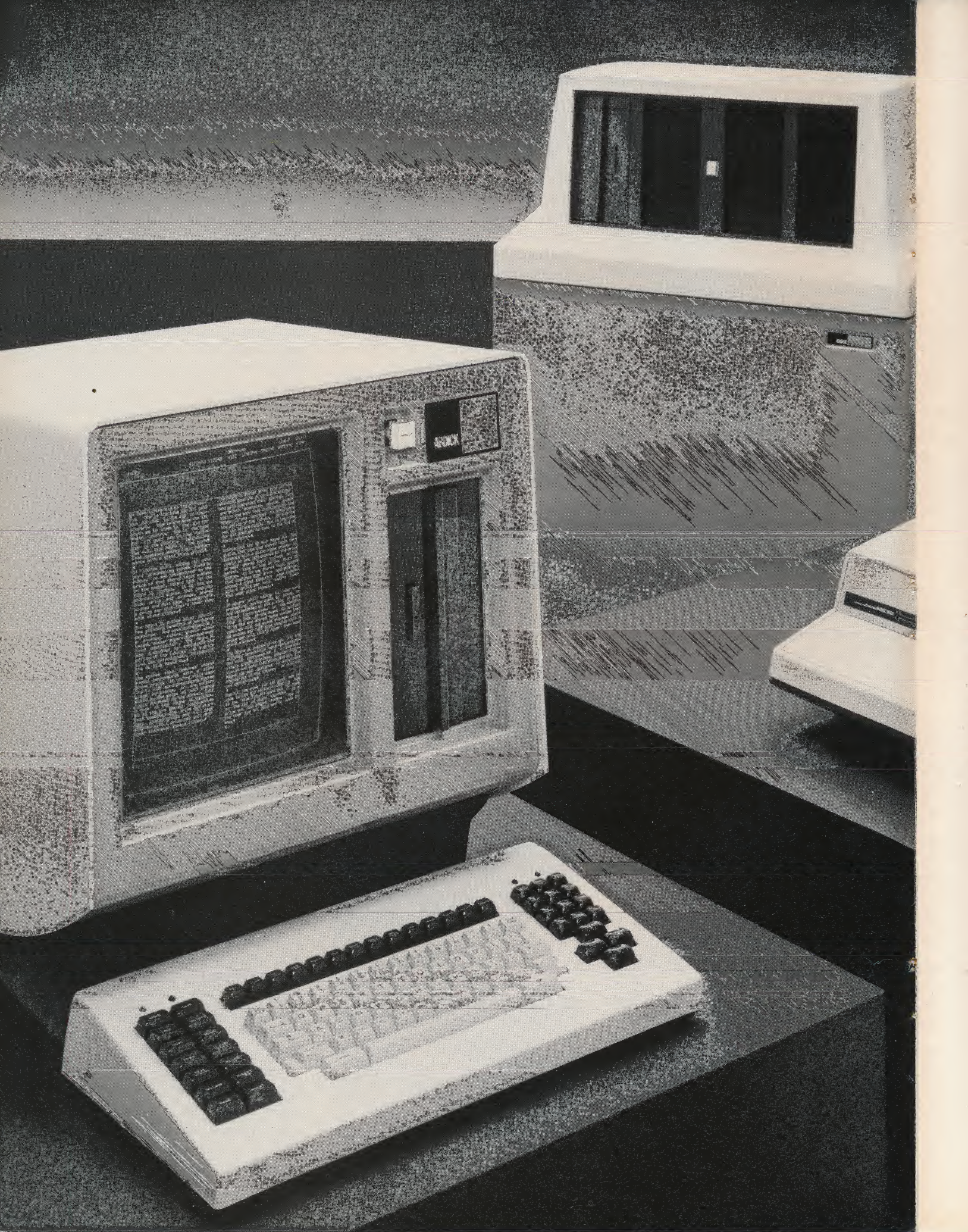
The Trust Company of New Jersey uses an electrostatic, non-impact printer to produce approximately 600,000 pages a month.



William J. Lipp has been employed by the Trust Company of New Jersey for 20 years. He has been involved in banking automation for the past 17 years, with a special interest in on-line systems and data communications. Mr. Lipp has also been a data processing instructor at the American Institute of Banking and an advisor on the Mayor's Committee for Data Processing in Jersey City, NJ.

Put Your Company in the CORPORATE SYSTEMS Spotlight.

If your firm has an innovative office system that you would like to have featured in CORPORATE SYSTEMS, contact Eileen Tunison, editor, CORPORATE SYSTEMS, 645 Stewart Avenue, Garden City, NY 11530, (516) 222-2500.



TRUST CO. OF NEW JERSEY TURNS OUT 600,000 PAGES A MONTH WITH NON-IMPACT PRINTER

Problem:

Headquartered in Jersey City, NJ, the Trust Company of New Jersey is one of the largest commercial banks in that state. We handle about 100,000 savings accounts, 50,000 checking accounts and 25,000 installment loan accounts in our 19 branches, and demand for printed forms is enormous. Despite our efforts to control our forms operation, our paperwork demands continued to grow at a rapid rate.

By mid-1977, we were storing up to 75 different custom forms to produce customer statements and internal reports. This large number of forms was as unwieldy as it was expensive to maintain. By the year's end, inventory costs alone totalled over \$20,000. The computer center, which had to contend with this myriad of forms, was working three full shifts a day in order to turn out the required volume of bank statements and reports.

To add to our problems, the 1100-line-per-minute impact printer we were using was having trouble keeping up with this volume. Another drawback of this printing method

was that account statements had to be burst and decollated before they were sent to bookkeeping for stuffing with cancelled checks.

On top of everything else, several executives were refusing to accept the carbon copies produced by the printer. They found these copies were smudged at best and illegible at worst.

We needed a more flexible system and we needed it badly.

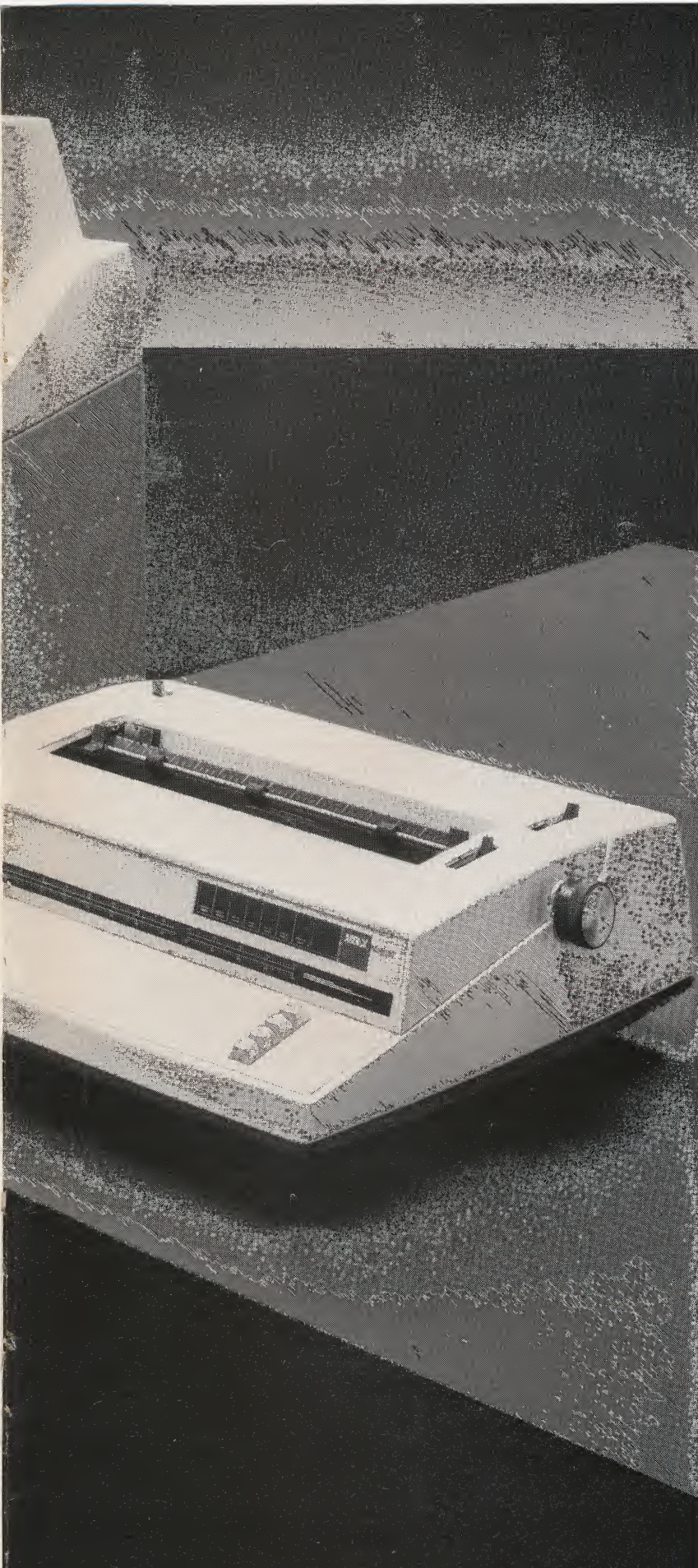
Action Taken:

In 1977, while visiting the offices of Hoffman-LaRoche in Nutley, NJ, I saw the Honeywell Page Printing System (PPS), a non-impact printer that operates electrostatically and uses special roll-fed paper developed by Crown Zellerbach's Electrographic Paper Division. I had heard about the system two years previous to that visit, but didn't consider it seriously for our operation at that time.

However, by 1977 our paperwork production needs were growing by leaps and bounds, so I decided to

by William J. Lipp
Manager of Systems
and Computer Operations
Trust Company of New Jersey
Jersey City, New Jersey

IN MID-1977, THE TRUST COMPANY OF NEW JERSEY WAS STORING UP TO 75 DIFFERENT IMPACT-PRINTED CUSTOM FORMS TO PRODUCE CUSTOMER STATEMENTS AND INTERNAL REPORTS. THIS SYSTEM WAS UNWIELDLY AND EXPENSIVE, WITH INVENTORY COSTS TOPPING \$20,000 A YEAR. THE FIRM SWITCHED TO A NON-IMPACT, ELECTROSTATIC PRINTER THAT IS EIGHT TIMES FASTER THAN THE PREVIOUS UNIT. ASIDE FROM FREEING UP THE FIRM'S MAINFRAMES, THE PRINTER HAS HELPED SHAVE ALMOST THREE HOURS OFF THE STATEMENT PRODUCTION PROCESS.



Introducing the Magna SL.

Big-system storage and performance at a stand-alone price.

If you're considering a multi-unit word processing system, why just add more stand-alone units? Add the increased productivity of A. B. Dick's Magna SL. Our system costs the same per work station as most stand-alone units. But it does so much more.

Full-page display. With the Magna SL's full-page display, you see the full 8½" x 11" page in one glance. So the operator can quickly check final copy on the screen before it's printed. There's less guesswork, too, because the Magna SL eliminates most codes. And with instant document access and over 550 words per minute printing speed, the Magna SL has the capacity to handle all your toughest text-editing jobs economically.

Multiple-disk storage. With the Magna SL system all your text is recorded on flexible disks and organized into files. Each disk can accommodate up to 330,000 characters. Each terminal can access every disk, which enables operators to share the workload on long-text or rush jobs. And since all files are listed in a directory with a corresponding index, text retrieval is fast and accurate.

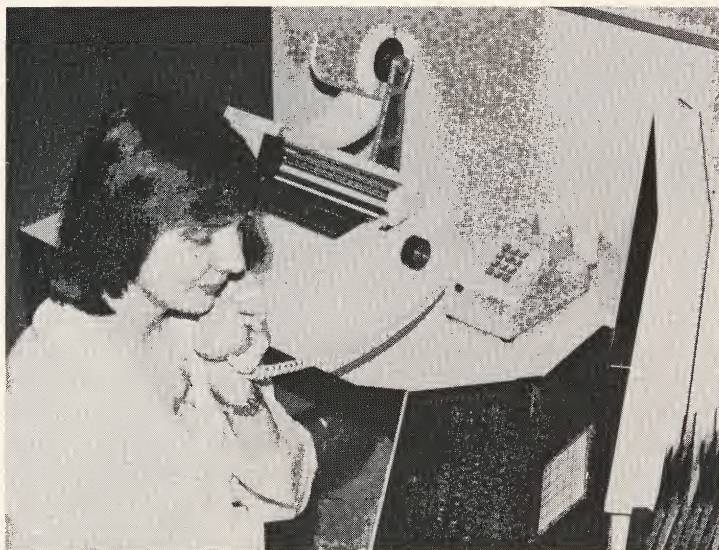
Flexibility for the future. The SL eliminates costly media conversion because it's compatible with the A. B. Dick Magna I and II electronic typewriters, both of which accommodate IBM Mag Cards. This enables the system to read card-to-disk and disk-to-card. And both typewriters can operate as a free-standing text editor, a remote printer, or as part of the entire SL system.

Best of all, the system has the flexibility to grow as your business grows. You simply add additional work stations as you need them. The A. B. Dick Magna SL was designed to anticipate the office of the future with a price you can afford today.

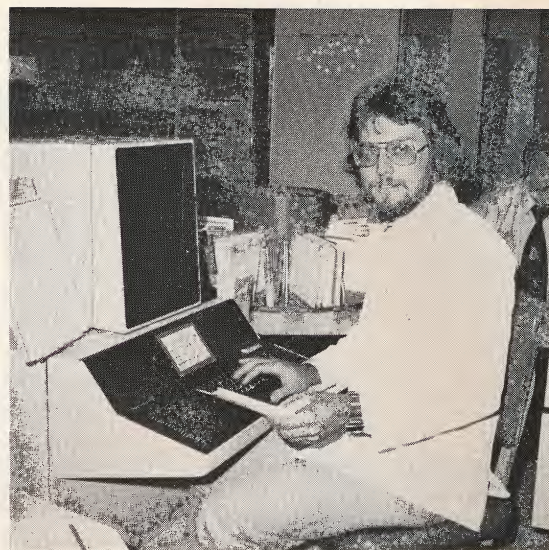
For more information write to us at
A. B. Dick Company, Dept. C-2/8,
5700 W. Touhy Avenue, Chicago, IL 60648.

ABDICK

Circle No. 5 — See Center Spread



A technician recalls a patient's therapy from the word processing system's memory onto the full page display.



One of the hospital's interns keys a prescription into the WP system, where it is stored on diskette.

repetitive functions and simplify them into minimal keystroke commands. A rugged keyboard was also a necessity because approximately 28 people use the system on a rotating basis.

Training time was one of our most important considerations. The standard training package takes an average of eight to 12 hours. Most of our employees learn the Redactor in four to six hours, which is followed by two to four hours of specific training on how the Intravenous Admixture Service integrates with the word processors.

In conjunction with the installation of the word processing equipment, we decided to change our method of operation. Instead of preparing I.V.s on a patient-by-patient basis, we began compounding these solutions on an hour-by-hour basis.

This change made quite a difference in our operation. Instead of preparing the entire day's I.V.s at one time, which resulted in a backlog of work in the morning, we can prepare the I.V.s on an hour-by-hour basis. This creates a more even flow of work throughout the day and cuts down on circumstances that result in wastage — such as a physician changing a therapy that the pharmacist has already prepared.

After a doctor writes an order for a new patient's therapy, the information is keyed into the Redactor II and stored on diskette. It can then be called up in label format.

On the first day, two sets of labels are printed. The first set is affixed to a profile envelope. The second is placed in the envelope until it is affixed to an I.V. container. After the first day, only the second set of labels is printed by the Redactor II.

Patient envelopes are stored in a circular organizer that we bought and modified for our purposes. It rotates like a lazy susan and is divided into 24 time frames representing the hours of the day. Each envelope is placed in the slot corresponding to the time the next I.V. is due.

The circular organizer is available to the technician at the Redactor II and the pharmacist who is manufacturing the solutions in the Laminar Flow Hood (a "clean air" center). Using the circular organizer enables the pharmacist to prepare solutions on an hourly basis.

Result:

We repeated our wastage study six months after installing the Redactors and revamping our method of operation. For six weeks, we accounted for every wasted medication affected by the Intravenous Admixture Service.

Based on the results of this study, we estimated an annual saving of \$15,500, which cuts our wastage by more than half. We believe that as we continue using the system, we will increase our savings even more.

We've also cut back on the amount of time needed to produce labels.

Instead of three technicians typing labels for three hours each morning, we now need only one technician for one to one-and-a-half hours a day, since the Redactor II prints out the day's labels in about 45 minutes.

The technicians who are no longer needed to type labels spend their time in another area of the department to help that service function more smoothly. This has resulted in a saving in personnel time valued at approximately \$18,000 annually.

We have also realized a reduction in the number of pharmacists needed to work the system. In the past, two or three pharmacists were needed to prepare the I.V.s in the morning; now, only one is required.

As a result of our improved system, we have found much better compliance in the administration of the intravenous fluids. Nurses are more acutely aware of the patients' schedules for these medications since the Redactor II stores this information. The end result is better patient care. ☉



Jack Cronk has been manager of Pharmaceutical Services for Holy Cross Hospital for nearly three years. Prior to that, he was director of pharmacy at Wyandotte General Hospital in Wyandotte, MI. He has a master of science degree in Hospital Administration from Wayne State University in Detroit. In addition, Mr. Cronk is currently president of the Southeastern Michigan Society of Hospital Pharmacists.

cost graphic display systems; automatically routed electronic mail; and on-premise digital satellite systems."

The low cost of microprocessors has also led to distributed processing in telephone systems. "With microprocessors coming down in cost as much as they have, we can now take the switching functions and distribute them among a whole series of microprocessors," explained Leonard Licata, president of GTE Automatic Electric. "This eliminates the need to write a single, all-inclusive program in software that incorporates all of the switching functions. We can now allocate individual microprocessors, each with its own program, to a specific function or a much smaller group of switching functions."

Predicting the future

All of the aforementioned developments have set the stage for the revolutionary changes that are being forecast for the next five years. These changes will involve the integration of communications and information processing technologies and the subsequent creation of multi-function terminals; the refinement of existing technologies; and the development of new technologies such as voice recognition and response systems.

"The 1980s should see an information revolution similar to the industrial revolution of the mid-1800s," predicted Dan Hosage of Datapoint. "In the majority of offices, new systems will begin to appear."

"Systems such as word processors, laser printers and message systems integrated with voice systems will be adopted by more and more companies. By the end of the '80s, leading-edge companies will have people working at multi-function workstations that will be capable of performing word processing, electronic mail and data processing in a fully integrated manner."

"In each office there will be a connection to the super controller," he continued. "This will enable workers to draw data processing information, incorporate it in a report, put it in message form and mail it to the recipient. The telephone instrument

that will be part of the workstation will do much more than merely handle voice calls; it will provide voice store-and-forward capability inter-leaves with facsimile, data and message communications systems."

R. Stewart Brunhouse, Jr., vice president of marketing at Tele/Resources, confirmed this forecast. "I believe we will see the development

provide the executive with the morning newspaper and other timely, selective items of interest such as stock tables, sports results and international financial events, which will be displayed on the screen."

"The most significant change in the office will be the integration of voice, data, message and imaging systems into one integrated network,"

"The 1980s should see an information revolution similar to the industrial revolution of the mid-1800s. . . . By the end of the '80s, leading-edge companies will have people working at multi-function workstations that will be capable of performing word processing, electronic mail and data processing in a fully integrated manner."

of the Integrated Office Controller (IOC) concept toward the mid-1980s," he stated. "This is a central processor with the ability to control the switching of voice, data, video, fax and electronic mail over the most economical transmission facility available to the user. And, all of this will be done transparent to the user."

These changes will have a significant impact on the productivity of the office workers. "Looking to the future, we may expect to see significant increases in the number of terminal-based office work support systems, which will be designed to improve the productivity of the office work force," predicted C. S. Pedler, vice president, strategic planning and control for the Teletype Corp.

"Companies with substantial experience in communications-intensive computer applications will be moving to develop new network arrangements that will permit the consolidation of several applications in a single network. Further, these users will be installing clustered terminal systems that can interact with many applications, providing multi-functionality on any given terminal."

The office of 1985

How will the office of 1985 differ from the office of today? Panafax's Robert Siegler gave us this scenario: "There will be small video receivers that will be multi-functional. They will be capable of receiving corporate correspondence with the recipient having the option of pushing a button to get a hard copy. They will

stated J. Marvin Reynolds, vice president of marketing operations at Avanti. "Communicating word processors, desktop computers, telex/TWX, facsimile and telephones will all share the same bandwidth. They will be linked via satellite and will be locally connected by products such as modems."

Another way the office of 1985 will differ from the office of today is in the number and types of business systems used and in the organizational changes that will be made to take full advantage of these new technological developments.

"In 1985, there will be more types of business equipment in the office than there are today," predicted Gerald Tomanek, group product manager/office automation at Rolm Telecommunications. "These will range from integrated, multi-function workstations to advanced printers and copiers. Electronic mail and teleconferencing will be routine for many firms, and wideband applications will be developing to take advantage of the new digital common carriers."

"Some companies will be extending their electronic office from intra-company to inter-company networks. The leading innovators will be reorganizing their companies and redefining office jobs to take maximum advantage of the available new technologies."

Executone's Hellering feels that phone systems will play a vital role in the office of '85. "At Executone, we expect that the telephone switching system in a business is going to

DISPLAY EDITORS PROVE TO BE RIGHT R FOR HOLY CROSS PHARMACY

by Jack D. Cronk, M.S., R. Ph.
Manager, Pharmaceutical Services
Holy Cross Hospital
Detroit, Michigan

The handling of paperwork for the Holy Cross Hospital pharmacy's Intravenous Admixture Service used to be a manual operation — until the institution quadrupled in size. Now, Holy Cross is using dual disk display word processors, permitting the hospital to prepare prescriptions on an as-needed basis. First-year savings totalled \$15,500 in drugs, plus approximately \$18,000 in personnel time.

Problem:

The practice of hospital pharmacy is an ever-changing and growing profession. One of the more recent services offered by most hospital pharmacies around the country is an Intravenous (I.V.) Admixture Service, which requires the compounding of a number of medications within a vehicle such as a saline or carbohydrate solution. The system by which these solutions are identified, scheduled for compounding, prepared for delivery, scheduled for administration and monitored for compliance varies from one hospital to another.

Old system was inadequate

At Holy Cross Hospital, we had been using a manual approach to handle this system. This worked when we were a 100-bed hospital, but when we grew to 400 beds, the system became totally inadequate.

A major part of the problem was the excessive amount of paperwork generated. For instance, labels had to be typed for every I.V. we prepared. We had been producing these labels on manual typewriters, and then logging each entry on a profile or perpetual log sheet. With over 130,000 I.V.s dispensed annually by our pharmacy, this proved to be a time-consuming process.

Every morning, the day's I.V.s had to be prepared and all the labels typed. It took three technicians three hours each to type the labels, plus one technician to maintain the process for the remainder of the day.

In addition, since the entire day's I.V.s were prepared in the morning, we had to contend with changes in therapy or the discontinuance of the I.V. This led to a considerable waste, which we calculated to be \$30,000 a year.

We knew we had to improve the service, and we defined two areas that would be used to monitor our progress: a decrease in the amount of drugs wasted and a reduction in the time needed to type labels.

Action Taken:

We set up a four-member task force that was charged with identifying all aspects of an Intravenous Admixture Service. They were to define what would constitute an optimal service and what equipment would be needed to create a superior system.

After studying the group's recommendations, management decided to install a word processing system that would be capable of handling our high volume of work, as well as the number of hour-by-hour changes that are characteristic of a service such as ours.

We evaluated half-a-dozen systems and eventually selected the Redactor II dual disk drive from Burroughs. There were a number of reasons for our decision. First, the system utilizes mini diskettes, which provide the rapid access to and retrieval of data that is necessary to meet our needs.

The system's full page visual display allows us to show most of a patient's therapies on the screen at one time, and the formatting ability allows us to define our page length so that we can scroll to display as many labels as we want to see. We can also place vertical tab stops in such a way as to make the machine compatible with our label stock.

The clarity of the display was another factor in our decision, as was ease of editing. The latter is essential because we use the edit mode 100 to 125 times in the first 60 to 90 minutes of operation each day, then repeatedly throughout the day.

Automatic indexing or alphabetical listing of patients currently on therapy was a must for any system we chose. The Redactor II has the ability to extend or expand the therapy after a patient is already in the system — a feature that saves us a lot of needless concern about manual logging and retrieval.

Another deciding factor in our selection was the customer programming offered on the unit. This feature allows us to define our common

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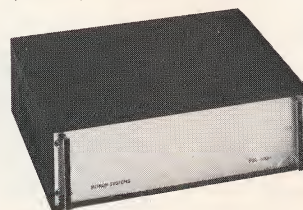
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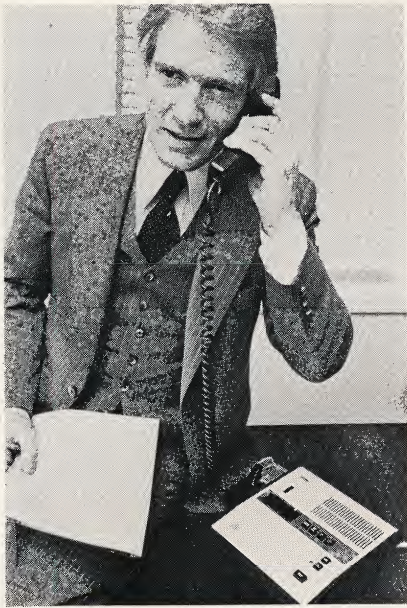
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be the vehicle for switching all information in the future," he declared. "Phones are already interfacing with other systems — data and word processing systems, facsimile, electronic mail, etc. In addition, interconnect systems can also be used to activate other equipment such as security or control systems."

Ron Raffensperger, Rolm's product manager, agreed with this viewpoint. "The computer-controlled digital telephone switch will become the brain and central nervous system of the future office, linking office workers and information systems and tying them into other locations via wide bandwidth digital common carriers," he remarked.

Refining existing technologies

The second major trend that communications users can expect to see during the next five years is the refinement and expansion into common usage of a number of existing technologies. Some of these will be technologies that have been used in other industries but have not yet been applied to the communications area; others will be technologies that are currently available but are not yet economically feasible for the majority of American businesses.

This trend is very evident in the facsimile area. "I believe the next few years will bring more changes at a faster rate — what we call an industry metamorphosis," explained Qwip's president, John Cochran.

"The next few years will be characterized by more general customer use. Facsimile products will be friendly and easy to use, and communications compatibility with a wide variety of competitive products will be an essential feature."

"We also expect to see more product enhancements that automate telephone dialing and telecommunications message management," he continued. "Advances in LSI and VLSI components will reduce the high cost of digital products, creating new opportunities for exploration."

"Xerographic printing technology and advances in digital communications will spawn a new industry subset of intelligent printers that will be used as communications devices and as office systems peripherals. In the next few years, we will also see more plain paper fax devices using a variety of printing techniques, including laser and ink jet printing."

Douglas Linsley, Muirhead's marketing manager, made some additional predictions concerning the facsimile industry. "I foresee the increased use of higher resolution systems," he stated. "This will be made possible by continuing improvements in bandwidth expansion and more sophisticated compression techniques."

"In addition, the development and expansion of cable TV and community antenna (CATV) may bring about vast growth in the use of fax for handling specialized services, such as transmitting medical, legal and technical information from central sources. In this way, lawyers, doctors and engineers, for example, could review data on their CRTs, and then get a permanent fax printout."

This "soft/hard" copy approach is one that Linsley feels will be used frequently in the 1980s. Although he acknowledges the fact that an increasing number of message communications will involve "soft" data that can be called up on a CRT screen for review, Linsley feels that "hard" copy availability is an option that is mandated by custom, and, in certain situations, by necessity.

The application of digital technology to communications systems is a trend that should continue, and even

accelerate, during this decade. There are a number of advantages to the use of digital technology, including the ability to custom-tailor systems to meet individual user needs and the opportunity to achieve cost savings.

"During the 1980s, software computer technology that is now being demonstrated will permit the adaptation of digital switching systems by thousands of industry software specialists to the unique requirements of individual users," claimed Clarence Marshall, director of advanced technology at the Collins Communication Switching Systems Division of Rockwell International. "These technological advances will result in a revolution in telecommunications systems not unlike the data processing revolution of the 1960s."

"The new digital technology, especially in the transmission area, offers new opportunities for facilities savings," stated GTE's president, Leonard Licata. "When the facilities are largely converted to digital, it will also become advantageous to have the switching equipment itself be digital. This will allow the removal of costly interface devices from digital transmission facilities. Therefore, I believe that, over the next five years, we're going to see a greatly accelerated trend to install digital switching systems for voice, asynchronous and synchronous data."

Increasing use of networks

Ralph Lowry, international vice president of Intertel, predicted the increasing use of networks in the near future. "During the next five years," he remarked, "banking organizations, insurance companies, the oil industry and increasing numbers of multi-national firms will increase their reliance upon electronic data communications networks."

An important trend that is developing in the network area is that the communication network is becoming an alternate voice/digital network. "As new technologies in switching and transmission are introduced," stated George Dacey, vice president, Bell Labs, "the distinctions between digital and voice traffic are blurring."

The sharing of communications lines for concurrent voice and data

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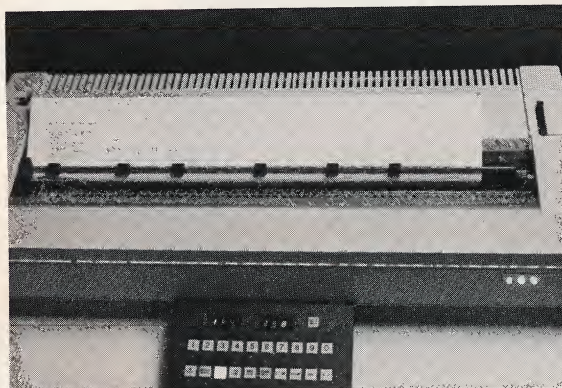
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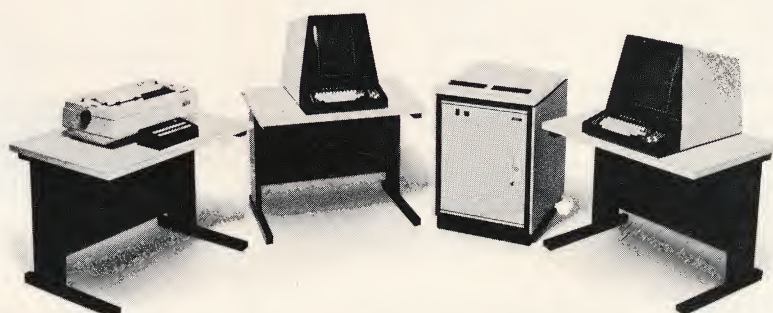
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 **Basic Four**

MAI

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transmissions will be accelerated by the application of digitized voice technology, according to Ray Sanders, chairman of the board at Tran Telecommunications. Sanders believes that digitized voice will be made economic within five years, thanks to recent developments in voice encoders that have reduced the bandwidth requirements by a factor of 10 or 20.

This multi-purpose network is an extremely important development. "If we can make advances toward a single form of communications network (which will probably be digitally based in both transmission techniques and switching logic) that can be used for voice, data, facsimile and other forms of text and visual transmission, it will be a very significant advancement of communications technology," declared Dr. W. Dwain Simpson, vice president of technical development at Periphonics.

"It would not be difficult for the office of 1985 to be connected to other offices with devices that permit voice, message, text and fax transmissions to be routed along with computer data as easily as we now transfer information using voice transmission via the telephone," he continued. "Message switching technology already exists in some fields, and a common communication architecture would permit an extension to, or inclusion of, other message transmission techniques."

The general use of message switching technology in communications networks is just around the corner, according to Dal Berry of Burroughs. "Within the next few years, users can look forward to the introduction of message switching systems to control message traffic according to user-established priorities," he predicted. "The message switch may be able to accept input from different kinds of communications stations (analog fax, digital fax, communicating word processors, etc.) and channel messages to different types of equipment."

These development in transmission and message switching systems should have a tremendous impact on the growth of the electronic mail industry. "Continuing reductions in communications line costs (due to

greater utilization in non-peak-hour rate periods) and widespread availability of fiber optics cables and satellite relay stations are likely to bring the cost of electronic mail on a per-message basis within striking distance of regular first class mail costs by the end of this decade," Berry commented.

Doelger of TDX believes that advances in satellite communications,

"Continuing reductions in communications line costs... and widespread availability of fiber optics cables and satellite relay stations are likely to bring the cost of electronic mail within striking distance of regular first class mail costs by the end of this decade."

and a possible decision by the FCC to permit the sharing of WATS service, will help to make electronic mail an economically feasible concept.

"These advances, together with continuing developments in the microprocessor field, will bring us a lot closer to 'real-time' inter-office communications," he predicted. "Within five years, the practical use of electronic mail at economic rates should at last become a reality."

Methods of transmission

Whether used for voice, data, text and/or visual communications, the three methods of transmission most often mentioned as frontrunners in the 80s are satellite, microwave and lightwave or fiber optics. The pros and cons of satellite and microwave systems vs. terrestrial systems are the subject of intense discussion and speculation, but the outcome, at this point, is anybody's guess.

Fox of Western Union feels that small earth terminals will be used increasingly by business for receiving voice, data, facsimile and video communications via satellite.

"These 'rooftop' antennas will provide a cost-effective alternative to landline transmission systems," he claimed. "Hundreds of thousands of standardized business communica-

tions, inquiries, mail, memoranda and reports could be sent as a bulk offering via satellite, substantially reducing the high cost of transporting millions of tons of paper across the country each day."

Satellites will continue to do well, according to Sanders of Tran Telecommunications, but he does mention several limitations, including spectrum congestion and inherent delay. "The limitation of greatest concern, however, may be satellite vulnerability, especially in light of international tensions," he explained.

Sanders believes that microwave will remain a preferred medium for long distance communications in the '80s, but feels it will not be used as much for local distribution because of bandwidth congestion problems. He does make an exception of the use of microwave for local broadcasting, however.

George Dacey of Bell Labs discussed the relative merits of satellite and terrestrial transmission systems. "Satellites are certainly going to play an increasingly important role in telecommunications," he stated. "However, this technology must compete with terrestrial means of doing the same job — and in many cases, it is more economical to do the job on the ground

"I don't mean to suggest that we are turning away from satellite transmission. In fact, Bell Labs currently has a proposal for an electronic beam scan, more humorously called 'the moving finger.'"

"At the present time," Dacey continued, "most satellites use one fixed beam covering a wide area that includes most of the United States. Our new technology would use a narrow microwave beam that would rapidly sweep across the entire U.S. in much the same way as an electronic beam scans a television screen. In addition to this 'moving finger' concept, we would also propose about a dozen 'fixed beams' to service major cities that have very heavy telecommunications traffic."

"Intriguing as this concept is," Dacey concluded, "it ultimately must face the economic test of the real world. Many political and international questions must also be re-

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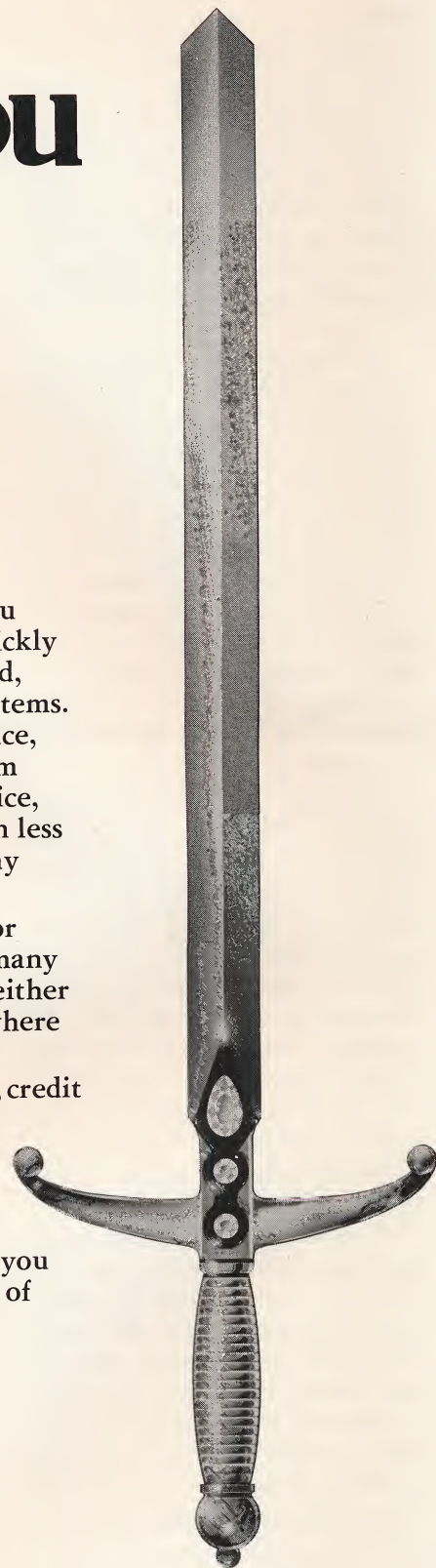
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The use of the ESMs would not have been possible without the new corporate mail center, which occupies the ground and plaza levels of a high-rise building. We use the plaza-level loading dock for pick-up and delivery of mail to and from our other buildings, as well as the main Philadelphia Post Office.

After unloading mail, the center's employees move it across wide, tiled cartways to the carpeted incoming mail area. The walls are covered with a tough plastic material that prevents damage from scrapes by the mail carts. Acoustical tile ceilings and sound baffles are used to lessen the noise from the Opex Rapid Extraction Desks, Baum



The use of the electronic sorting machines would not have been possible without Colonial Penn's new corporate mail center.

folders and Phillipsburg inserters.

The mail center is well designed and provides sufficient working space. These elements, plus the color-coordinated decor, provide a pleasant work environment that encourages employees to do a better job of mail processing.

In addition, we upgraded our job responsibilities so that our mail center people are scanning and fine-sorting mail that used to be done in other departments. By adding more functions to mail center jobs, we have made it possible for employees there to rise steadily in the salary structure to become equal with workers in similar job functions.

Colonial Penn, as a direct-response company, recognizes the crucial role its mail center employees have in the total operation. The company has not only created a better physical environment, it has developed a better career environment as well.

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Our goal is to be the number one mail handling facility in the country, and we are well on our way to achieving that goal. We have made the transition to our new facility; the insurance mailing operations have been combined successfully under one management; and all internal mail distribution is now handled through the mail center.

The ESM system is performing at the level of efficiency we had anticipated. Initial incoming mail results show a performance rate of over 99 percent, which means that the machines are correctly scanning, reading and sorting the incoming mail virtually error-free. Although the initial period of testing and troubleshooting took a little longer than anticipated, there were no problems that Leigh could not rectify.

The most important benefit we have achieved through the use of the ESMs is decreased turnaround time for customer service. With the Unique ZIP, we can pick up mail from the post office 24 hours a day, rather than waiting for it to be sorted and delivered. In fact, 70 percent of

our daily mail is in the company ready for sorting by 9 a.m.

After we run the mail through the ESM, a fleet of three vans, which leaves the mail center every 30 minutes, delivers it to the other Colonial Penn buildings in the city, all of which are within a mile of the sorting operation.

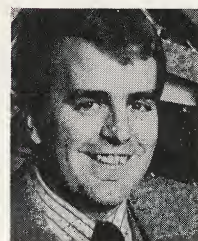
Better customer service

As a result, correspondence from our customers reaches the proper department for processing much faster than with our previous internal system. This is especially important to our customers, many of whom are awaiting benefit checks for claims on their insurance coverage.

Of course, the company also benefits. We gain a tremendous amount of goodwill when we serve our insureds as fast as possible. As an added financial bonus, the new system allows premium payments to be deposited and credited to the company's account much faster, thereby improving our cash flow.

The total transformation to Unique ZIP, bar-coded mail will take about one more year. To maximize cost effectiveness, all envelope and letterhead stock will be reordered with the ZIP bar code system as inventories are depleted.

In the final analysis, the mail center can provide the systems and equipment, but the ultimate benefit depends on the cooperation of the insurance operating areas. With this in mind, a company-wide ZIP Implementation Team has been formed to communicate the change to all the affected areas of the company. ☐



Gregory L. Gates, Sr., director of mail center operations, joined Colonial Penn Group in 1976. He and his staff are responsible for Colonial Penn's corporate mail center, which handles the mail

for all Colonial Penn Group insurance operations. Before joining Colonial Penn, Mr. Gates was associated with the Allstate Insurance Company as a division supervisor in the Valley Forge regional office. He is a 1972 graduate from Grove City College in Pennsylvania.

solved before we can use satellite transmission to its fullest."

Low-cost video conferencing

Of the many types of new technologies that will become available to the office manager, one of the most important, according to American Satellite's Johnson, will be the arrival of video conference systems.

"Star Trek-like video screen systems that can create a cross-country video conference within seconds are now beginning to be developed within the advanced laboratories of this country," he explained. "Once these systems are introduced, they will become as pervasive as the telephone, television and computer. They will change the way the office functions and will provide new avenues for the transfer of information."

Robert Martin, manager of marketing communications for Action Communication Systems, agreed with Johnson's forecast. "Video telephones and tele-conferencing will become more accepted as a normal manner in which to conduct meetings," he stated. "A series of teleconferencing network service bureaus will probably develop throughout the country to service companies that cannot afford their own equipment."

An example of video conferencing that is currently being tried is AT&T's Picturephone® Meeting Service, which provides for "face-to-face" conversations between people in different cities.

Digital transmission of voice

Another development that should prove extremely important in the '80s is the digital transmission of voice information. "Originally aimed at low density cable and microwave systems, the digital transmission of voice information is now being applied to more exciting transmission media," reported Marshall of Collins Switching Systems.

According to Marshall, his division has operating as a laboratory prototype an end instrument that converts a voice signal to a digital stream at its origin. "This development," he stated, "when combined with the availability of long range, wideband digital transmission facili-

ties, opens up the potential for a desktop, integrated voice and data communication capability."

Within the next few years, office managers can expect development of a voice message system that will "extend the capabilities of today's digital telephone switching systems," according to Jim Hunter, director of product marketing at Compression Labs. "In addition, during the latter part of the next five years, we can expect the introduction of either a time-shared or standalone voice-to-hard-copy transcription unit."

A computer that can understand and then respond to human speech is no longer a concept straight out of a science fiction movie. "We are working to enable computers to understand and respond to audible human speech," Dacey of Bell Labs revealed. "It is important for the man-machine interfaces of the future that computers be able to hear and understand humans, as well as being able to speak to them."

"Of course, we have quite a way to go to make computerized speech a practical, usable development. The talking computer is not quite economically feasible as yet because it needs a very powerful computer and a great deal of complicated software. However, progress in solid state technology has been extremely rapid — and that day is fast approaching."

Impact on people

New advances in technology are being made every day, but the impact of this technology on people — specifically, office workers — is as yet unknown. The communications industry can only guess at the effects their products will have on people working in the office of 1985.

"In the next five years, we will see communications technology called upon not only to promote office efficiency, but also to help resolve larger social problems — such as the energy shortage — which transcend the office environment," predicted Rapi-com's Winkler. "The use of high speed facsimile and satellite systems for teleconferencing and electronic mail is a good example of how communications technology will be used as energy-efficient alternatives to bus-

iness travel and traditional mail and message delivery methods."

Bob Martin of Action went even further in his predictions about the impact communications would have on the office worker. "With the increasing cost of commuting," he remarked, "progressive companies will be encouraged to have professional employees work out of their homes or in mini-offices closer to the population centers."

GTE's Licata also foresees the day when people will be working out of their homes or from mini-offices. "These people," he remarked, "will

"The use of facsimile and satellite systems for teleconferencing and electronic mail is a good example of how communications technology will be used as energy-efficient alternatives to business travel and traditional mail and message delivery methods."

be using terminals through which they can access the company headquarters for information that they need to do their work. Another off-shot of that would be branch office facilities for groups of workers.

"I can see this kind of arrangement developing in the future. By 1985, it's conceivable that it may be a familiar mode of operation for a number of companies."

"The office as we know it today will become more distributed," agreed Hunter of Compression Labs. "Less reliance will be placed on having a centralized office to which workers must go daily. The potential will exist to bring the work to the workers rather than the other way around."

Another important change will be in people's attitudes toward communications. "The business person is going to become as aware of the applications of telecommunications functions as he became aware of data processing a generation ago," declared MCI's McGowan. "This awareness is going to be a significant development — a development that spells a fantastic era of growth for the telecommunications industry — from now until well into the twenty-first century." ④

- Apply for a USPS Unique ZIP Code.
- Purchase high speed mail sorting equipment capable of processing both incoming and outgoing mail.

Two management teams, made up of representatives from Colonial Penn's operating and staff departments, were then given responsibility for implementing these recommendations.

Less than a year after these recommendations were made, we moved into our new 35,000-square-foot corporate mail center in another centrally located Philadelphia facility. We purchased two electronic sorting machines (ESMs) from Leigh Instruments Limited of Canada, making Colonial Penn the first private-sector customer for Leigh mail sorting machines in the United States.

Leigh's machines were selected over those of five other companies. Our decision was based on extensive investigations, which involved visiting vendors to see their equipment in operation and making several trips to Canada to observe Leigh machines in that country's postal system.

The first ESM was delivered and assembled in early October 1979. For months before the machine was delivered, mail center employees worked with the Leigh Company to develop procedures and operating programs and to prepare for the machine's installation. Leigh engineers accompanied the machine to Philadelphia for final assembly, and worked with Colonial Penn people to fine-tune the ESM by running over 400,000 pieces of test mail.

Dramatic changes in operation

The sorting machines made a dramatic difference in both the accuracy and speed with which we do our business. In pre-ESM days, to collect each day's mail — which on busy days can amount to 150,000 pieces — we had to make several trips to post office boxes, where USPS workers had funneled the mail.

With the ESM and our Unique ZIP Code, we no longer rely on the USPS workers to sort our mail by box number. Postal workers now tray all Colonial Penn mail by ZIP Code only;



Electronic sorting machines (ESMs) speed delivery of up to 150,000 pieces of mail a day at Colonial Penn.

when we pick it up, it is not sorted for internal corporate distribution.

This is where the ESM pays off. Over the past year, we have been phasing in bar-coded envelopes for much of the mail sent to us by insureds. For example, a person paying his automobile insurance premium will use a special coded envelope provided by the company. When this envelope reaches Colonial Penn, we run it through the ESM, which reads the bar code, recognizes that the envelope contains an auto premium payment and deposits it in the auto insurance collection pocket.

"White" mail (mail that is not bar coded) is currently hand sorted, but we soon expect to handle it at an off-line coding desk where an operator will assign a bar code to the envelopes. Uncoded mail represents approximately 35 percent of our receipts, but we are gradually decreasing this percentage by providing bar-coded envelopes to those operating areas that had previously received the largest percentage of uncoded mail.

We have tremendous flexibility with the five-digit bar coding. By recombining the five digits in different sequences, we can actually attain the sorting capacity of 10,000 post office boxes. And, there are interesting ways in which we can use this capability.

For example, several times each year, Colonial Penn solicits business

through mail campaigns. A large health insurance campaign could represent mailings to several million people. (Solicitation mailings are handled by the mailhouse division of Hawthorne Advertising, Inc., a Colonial Penn subsidiary, and not by the corporate mail center. Hawthorne mails in excess of 190 million bulk pieces each year.)

By bar coding the response envelopes, we can monitor the results of a specific campaign by state or even by city. For instance, if a certain health insurance campaign is assigned in its own bar code, we can program the ESM to record the number of responses received that day when the mail is sorted.

By 10 a.m., the manager of that campaign will receive a printout of the mailing's current results. This not only shows how well the campaign is doing, but is also a valuable management tool for planning work flow.

Second ESM sorts outgoing mail

The second ESM, delivered in November, is equipped with an optical character reader (OCR) for pre-sorting outgoing mail. Pre-sorting has two major benefits for Colonial Penn: we get the USPS first class, pre-sort discount, and delivery time is reduced. Since USPS employees do not have to sort them, trays of pre-sorted mail can go right out of the post office, either by truck or air.

We are currently considering bypassing the Philadelphia post office altogether and taking pre-sorted, trayed mail directly to the USPS substation at Philadelphia International Airport, where it can be put on the first flight out. This would result in overnight mail delivery to far-off locations.

We hadn't previously taken advantage of pre-sorting because of the nature of our business. A large utility operation with hundreds of thousands of bills on the same computer form can use the computer to pre-sort the material as it comes from the inserting machines. But, in the insurance business, which involves selling a variety of products nationwide, we have smaller volumes of mail in many different cate-

KIDDER PEABODY OCR-ASSISTED EDITING/ PRODUCTION GOES UP,

BY JOHN SALUSTRI,
ASSOCIATE EDITOR

In 1979, the publishing services department of Kidder Peabody produced 8000 report pages, most of which had been keyboarded twice: once when the document was originated in rough draft form and again when it was recorded on magnetic tape for final editing. The firm moved to alleviate this problem by using display editing terminals on which copy is input via OCR equipment. Because the editing terminals are compatible with phototypesetters, many documents now need only be keyboarded once, circulated for corrections, read by the OCR, edited on the CRT screen and then—when perfect—printed out in hard copy or automatically typeset.

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Colonial Penn insures fast, efficient mail service by utilizing electronic sorting machines

BY GREGORY L. GATES, Sr.
DIRECTOR, MAIL CENTER OPERATIONS
COLONIAL PENN GROUP
PHILADELPHIA, PENNSYLVANIA

Colonial Penn, a multi-line insurance group, handled 44 million pieces of mail in 1979, and predictions for 1980 portend a considerably higher volume. Corporate feasibility-team investigations recommended centralizing all mail processing, applying for a USPS Unique ZIP Code and purchasing high speed electronic sorting machines. The recommendations were followed and have paid off. Using bar codes and OCR scanners the company is pre-sorting 80 percent of its outgoing mail, thus taking advantage of the Postal Service's pre-sort discount. Under the present system, correspondence is reaching the proper department much faster than before, and since this permits premium payments to be deposited and credited quickly, the firm's cash flow has been much improved.

PROBLEM:

Colonial Penn is the leading multi-line insurance group specializing in coverage for individuals 50 years of age and older. As a direct response insurer, we handle a tremendous volume of mail. In fact, we use this medium almost exclusively in all aspects of our business.

During 1979, Colonial Penn received 28 million pieces of incoming mail. In addition, the corporate mail center handled 16 million pieces of first-class outgoing mail during the same period.

Between 1972 and 1977, our mail volume more than doubled. To serve Colonial Penn's four Philadelphia locations, we used 52 post office boxes scattered throughout the city. Even though we had daily pick-ups from each of these boxes, cumbersome sorting procedures delayed mail for from one to three days in

the United States Postal Service before it arrived at Colonial Penn.

The post office box system worked in the days when our mail volume was small, but it became inadequate as our volume of mail continued to increase.

In addition, we found that the floors of a high-rise office building were not suited for mail handling operations. Since we had to share the freight elevator with other tenants in the building, it was a big problem just getting the mail from the sub-level loading dock to the work area. Mail sacks were hefted onto the freight elevator and hauled to the operation on the 34th floor on carts that were pushed with difficulty through narrow, carpeted corridors.

To add to the problem, our outgoing mail departments were organized by line of insurance — one for casualty operations and one for health and life insurance. Even

though both operations were functionally similar, they were handling large volumes of mail separately.

The condition of the mailing operations had a negative effect on employee morale, and the work environment was not a selling point for attracting new employees. While mail processing employees at Colonial Penn took great pride in their work, the physical facilities gave them little in which to take pride.

ACTION TAKEN:

In August 1977, a corporate feasibility team recommended approval of a mail center concept to senior management. The feasibility team made four recommendations:

- Combine all mail processing departments under one management umbrella.
- Construct a new ground floor facility.

IS BULLISH ON TYPESETTING SYSTEM: COSTS ARE DOWN

Problem:

With approximately 60 international branch offices, Kidder Peabody is one of the largest investment banking and brokerage firms in the world.

The firm's Research Department, which is divided into area groups such as Investor Services and Portfolio Strategy, is responsible for researching and writing all of the firm's reports. These reports cover topics ranging from the financial state of an individual company to an entire market, or the analysis of a single product or an entire industry.

The report manuscripts are published in Kidder's New York headquarters, where the firm maintains a four-person editorial staff and a complete production facility within its Publishing Services Department. The company also runs its own printing operation, where reports are printed on two Didde-Glaser Tandemer web presses.

"In addition to topical reports and in-depth company and industry reviews, there are weekly and monthly periodicals to produce," explained Jack Pancoast, manager of Publishing Services. "We handle an average of 30 composed pages per day, but this figure jumps to 70 pages per day in our busy season.

"What's more, our production staff does typesetting jobs for other departments, although 80% of our work is for the Research Department. In 1979, we composed a total of 8000 report pages."

"After a report is presented to us, it goes through an initial edit for grammar, punctuation and clarity," Pancoast continued. "After the initial edit, the report goes back to Research, where the author gets the chance to correct any changes in meaning that might have occurred in the editing process.

"When the author is through with the draft, it goes to one of our supervisory analysts, who are approved by the New York Stock Exchange and trained to review financial reports for content. The analyst suggests any rewriting that might be necessary and ensures that the report is balanced and objective and doesn't make any inflammatory or promissory statements."

After all the changes have been made, the draft goes back to the editor for final clean-up. It is then ready for production.

For easy handling, the drafts are divided into color-coded packets separating text and tables. Tables represent about 50% of each draft.

Until 1978, the department utilized five magnetic tape editing typewriters and two composers with tape drives. The system was adequate during normal production periods, according to Pancoast, but initial input was a time-consuming process. When a member of Pancoast's staff received a typewritten draft from an author, she had to rekey the entire document on the magnetic tape typewriter.

Tabular data caused even more problems, the manager reported. "Kidder employed several data base service bureaus—plus our own DEC 11/70 in-house data base management system — to compile much of the tabular material," he said. "Research statisticians accessed the data base by means of terminals, and Publishing Services received the output in the form of computer printouts.

"Keying the information from these printouts into the magnetic tape typewriter was tremendously time-consuming. In fact, one particular monthly report, which contains approximately 20 pages of closely packed tabular material, used to take two operators two days to keyboard."

Additional time was spent calcu-

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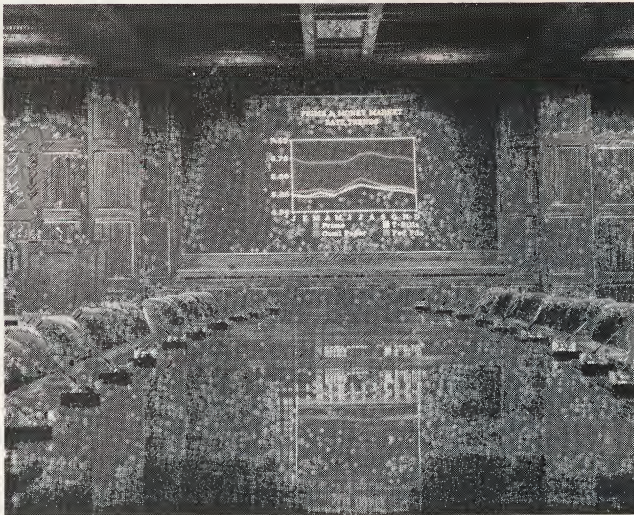
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lating heading widths and line lengths for the tables. This had to be done for every column in each table, whether that table was brand new or a recurring table that required slight revision. These calculations represented approximately one-half of the total input time.

"The only saving grace," Pancoast declared, "was that the department utilized a fairly rigid style in all of its reports, so it was possible to give tables to the typographer without having to spec them.

"All of our input problems magnified themselves during rush periods. There were two options available to us to relieve overloads: a permanent night shift or outside typesetting services. Neither was cost-justifiable. When necessary, we opted for the latter as the lesser of two evils, but turnaround time suffered nevertheless."

Action Taken:

In 1976, Kidder Peabody began looking for editing terminals that would be better able to handle the peak workloads and deliver greater processing power.

"The idea of standalone video terminals was intriguing because of the increased editing capabilities and the floppy disk storage they offered," Pancoast reported. "We felt the storage capability would be particularly helpful in table production, since many redundant tables could be "spiced" and entered into the system once, then called up from storage and easily updated on an as-needed basis."

The firm also wanted terminals with communications capabilities so they could be linked with the time-sharing services to capture tabular data.

"We wanted to be able to make necessary editorial changes on the terminals, and we did not want to have to rekeyboard the entire document," the manager noted. "The logical way to go was with an optical character recognition system (OCR)."

With OCR, the original reports

could be typed by the author's secretary on a typewriter equipped with an OCR typing element. The document could then be fed into the OCR unit, which would scan the report and transfer the data to disk storage. The report could then be called up on the terminal's display so that changes could be made.

The company also wanted to upgrade its composing system to a phototypesetter that would offer greater speed and reliability, as well as a variety of type styles.

Right features, right price

After an extensive investigation, Kidder Peabody discovered that Key Corp., a subsidiary of Alphatype Corp., could put together a complete text editing/phototypesetting system that offered the right features at the right price. The brokerage firm designed the system they wanted, and Key Corp. was hired as general contractor to build and test the system and deliver a working configuration.

The initial configuration consisted of two of Key Corp.'s Key III editing terminals with floppy disk storage. (Two more terminals were added by the end of the first year.)

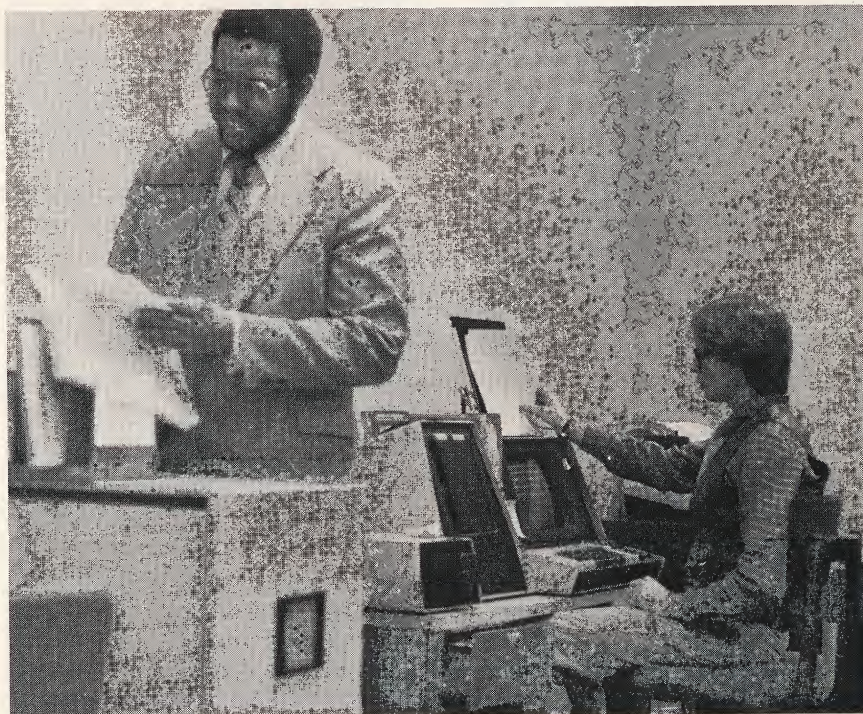
The terminals, which are used primarily for editing and updating material, are on-line with a Context

OCR unit, the primary source of input for non-tabular material, and two Diablo 1610 printers. A high speed Xerox 1760 printer/terminal was also obtained. For phototypesetting, the firm installed Itek Composition Systems' Mark IV Pacesetter, which is on-line to one of the editing terminals.

Two acoustic couplers provide access to the firm's in-house data processor and the various outside data services it employs. One coupler is hooked up to the Xerox printer/terminal so that the department can update jobs stored on time-sharing systems and can run programs that calculate line lengths for tables being typeset.

The other coupler is hooked up to one of the editing terminals to allow remotely stored jobs to be retrieved onto floppy disks for typesetting. The department also has hardwire hook-ups to its in-house DP system.

"We chose the Context OCR unit because it was the first scanner that Key Corp. interfaced with its terminals, and its speed was faster than some higher priced units — about nine sheets per minute," Pancoast said. "We decided to go with phototypesetting because it offered an increased variety of type styles and sizes, and the electronic operation



Kidder Peabody's text editing/photocomposition system with OCR scanner has reduced overtime and improved turnaround time while allowing the firm to fit 30% more material on a page, without reducing legibility.

Dictaphone Thought Center System 293 recorders were installed.

"Because of the tremendous fluctuation in the dictation workload at an institution such as ours, we needed this multiple-cassette central dictation system to help us through peak periods," Arthurs explained.

When the 193's tanks are full, we can "pull the system's plug," as she puts it, and drain the excess dictation onto the 293s' cassettes, which are usually sent to an outside service for transcribing. Doctors, unlike 9-to-5 business people, often dictate in bulk at odd hours, so they use the direct-wire 293s for old (after discharge) dictation.

The changeover to the new equipment didn't prove to be much of a problem. The firm's reps instructed Arthurs in the operation of the machines, and she taught the staff.

Today, the staff consists of four full-time and six part-time operators who transcribe dictation 24 hours a day, seven days a week.

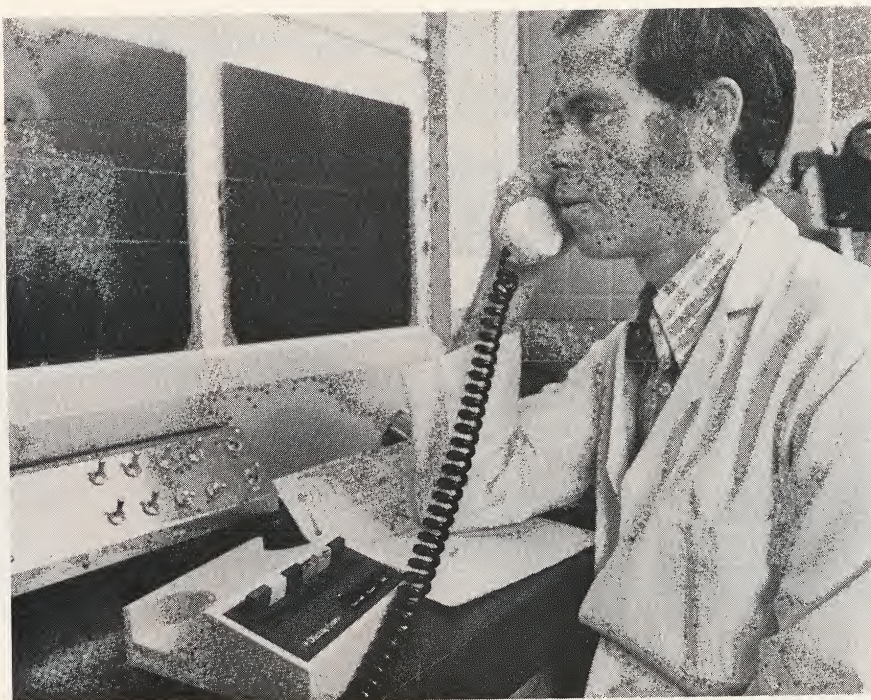
Upgraded text editors

The next step in our system renovation was an upgrade of our magnetic tape text editing system. The old system was simply too slow in

A final "quiet" benefit of the system lies in the improvement of operator morale. We believe that the new system helps attract, and keep, transcriptionists in the Medical Records Department because we have what we consider to be one of the best systems available.

producing printouts, and we realized that we needed CRT displays for speed. However, after investigating the WP market, we also realized that we needed a basic word processing system, but not a standalone. It did not have to be an incredibly advanced model, but it did have to have a CPU.

After looking at about 10 different systems and thoroughly reviewing the information on each, a decision was made to install six Wang System 25 Model 3 CRTs with printers.



At the University of Colorado Health Sciences Medical Center, a staff physician uses a private wire terminal to dictate patient X-ray reports. Doctors, unlike 9-to-5 business people, often dictate at odd hours, so the system is always available.

The Wang system filled our requirements quite nicely. It offered us the speed we were looking for, along with an increased facility for making corrections. Another point in Wang's favor was the fact that the System 25 would allow us to create our own programs (unlike some other systems that had programs that had to be purchased).

Unlike the changeover in the dictation equipment, upgrading to this new editing system proved to be a rather complex affair. Wang, however, set up classes at its headquarters at which all operators were given a week of training. This certainly helped to simplify the transition. Now, when we hire new people, those who were trained by the manufacturer teach the new operators.

RESULT:

We've noticed a number of tangible improvements since we expanded our total word processing operation. For instance, we have reduced our turnaround time and increased operator productivity about 25 percent. This translates into an increase of approximately 100 lines per full-

time operator per day; in some cases, that increase pushes 200 lines.

A final "quiet" benefit of the system lies in the improvement of operator morale. We believe that the new system helps attract, and keep, transcriptionists in the Medical Records Department because we have what we consider to be one of the best systems available.

Our recent experiences have taught us to closely watch the rapidly changing word processing scene, but to move at our own pace. The new transcription/text editing systems will serve our needs for the next five to six years, and we feel that the increased costs of the systems are more than justified by the ease with which they allow us to handle our ever-growing, irregular workload. ☺

Barbara J. Stephens is the director of Medical Records at the University of Colorado Health Sciences Center of Denver, CO. She is currently treasurer of the Colorado Medical Record Association and chairwoman of the membership committee of the Northern Colorado Medical Record Association.

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would be more reliable than the mechanized operation of the strike-on composers. We opted specifically for the Mark IV Pacesetter because of the firm's reputation for reliability and because we do not need the higher speed and other features of higher-priced units."

By January of 1977, the system was operational at Kidder Peabody. "Within a month of the installation, we were keying almost all of our text into the new system," he re-

The text editing/photocomposition system at Kidder Peabody has been able to absorb and efficiently handle a workload that has increased about 60% over the last three years.

ported. "We still prepared tables on the old equipment until we set up the program to automatically calculate column widths and plug in the resulting composition codes. All of these calculations are now made by the DEC 11/70, which can be accessed at any of the editing terminals or at the printer's terminal."

Most text input is via OCR

Nearly all text is input via the OCR scanner, according to Pancoast. "An increasing number of authors are preparing drafts in OCR-readable typefaces," he revealed. "Drafts that are not prepared in this way are rekeyed by the typographer or, in peak-load periods, sent out to be retyped or done by a temporary typist we bring in for that purpose. We only use the editing terminals to key a draft onto disk if the job is a rush job and the terminal is not being used for a higher priority project."

"Once the text portion of a job is on the disk, a terminal operator gives it an 'A' edit, making any editorial changes indicated on the original draft and automatically scanning the text for any characters the scanner couldn't read. The OCR unit has a can't-read rate of approximately one character in every three or four pages, which is acceptable to us." Pancoast noted that photocomposition codes are also input at this time.

Recurring tables are processed

simply by calling that particular job up from storage and plugging in the new material. For new tables, the operator uses the matrix printer/terminal to access the DEC 11/70 for computation of table parameters.

"The operator enters a maximum character count for each column, and the printer spits out the parameters," Pancoast explained. "He then enters the parameters and the table data at an editing terminal. Once tables are input, they are phototypeset for proofreading."

Once the text portion of the job has been edited, the printer prints out a hard copy for proofreading. When the final edit is completed, the text is ready for typesetting.

After typesetting, the various job packets are combined, and the galleys are sent to paste-up. Page proofs are distributed for final approvals and then mechanicals are sent to the firm's in-house print shop.

Result:

It has been three years since the text editing/photocomposition system was installed at Kidder Peabody, and Pancoast reports that it has been able to absorb and efficiently handle a steadily growing workload.

"We've taken on a number of new kinds of reports, including a two-page format which can be utilized up to 15 times a day," he said. "In all, composition volume has increased about 60% in the last three years, but we've also added a fifth Key III terminal. Despite increased volumes of work, we haven't farmed out a job to a typesetting shop in nearly a year."

Use of the OCR scanner for input has played a major part in handling overloads and reducing overtime, according to Pancoast.

"For example, one of our weekly reports is an eight page job with a lot of fussy composition requirements," he explained. "We usually receive it on Tuesdays at noon. By the end of the day, the job is ready for paste-up. We couldn't possibly complete that job in such a short

time period if it had to be rekeyed."

The ability to automatically calculate table parameters and the ease with which tables can be stored and updated have also improved turnaround time. Pancoast reported that input time for new tables has been cut in half since column widths and line lengths no longer have to be calculated manually.

"Overall throughput time depends totally on the size of the job and how complicated it is," Pancoast said. "But longer jobs, with a heavy table content, which formerly took four days to complete, now can be done in two. In cases such as time-sharing data bases, which are handled primarily at the video terminals, even lengthy jobs can usually be completed within a day's time."

The manager reported other improvements as well. Use of the phototypesetter, in tandem with the reworking of type sizes and styles, has allowed the department to fit 30% more material on a page, without reducing legibility. This has cut postage costs.

Pancoast estimates that composition costs in 1979 were probably \$75,000 less than they would have been if the firm were still using the old system.

He also predicts that the text editing/phototypesetting system will be enhanced in the years to come — particularly in the area of communications.

"We foresee a time when we will be able to eliminate nearly all rekeyboarding," he predicted. "We are now in the process of establishing a shared logic word processing system for use by all departments. The system will include software for automatically converting word processing codes to phototypesetting codes for both text and tables."

"These plans also include a provision for computer graphics for those charts that must be updated on a regular basis, and it is only a matter of time before authors will input directly to the system via their own departmental terminals. Also, within the next year, we hope to phase out the outside timesharing systems and rely primarily on our in-house computer." ☐

Periodically, changes were made in the system to keep pace with the department's growing demands. These included the installation of an endless-loop central dictation system and an upgraded text editor.

The last of these changes took place in 1977, when the continually growing number of patients forced us to, once again, reevaluate our equipment vis-a-vis the workload.

We knew we had to substantially improve the entire word processing system, but a "go-slow" approach was adopted because a state-run in-

alternatives before making a firm hardware decision.

ACTION TAKEN:

We had two separate buying decisions to make: dictation equipment on one hand, text editing systems on the other.

No less than four manufacturers' dictation systems were looked at

Periodically, changes were made in the system to keep pace with the department's growing demands. These included the installation of an endless-loop central dictation system and an upgraded text editor. The last of these changes took place in 1977, when the continually growing number of patients forced us to, once again, reevaluate our equipment.

stitution such as ours doesn't have a great deal of money to spend, and what we do have must be spent wisely. This means that we must thoroughly analyze hardware needs, examine vendor specifications and install any new equipment gradually.

Furthermore, we knew that the system we finally chose would be around for five or six years; an added incentive to investigate a variety of

before our specifications were submitted to the Purchasing Department. Dictaphone Corp. was eventually chosen to supply us with the new dictation equipment. We were pleased with this because we had had 14 of the firm's 180 central dictation systems for a number of years, and we were satisfied with both their machines and their service.

So, in 1977, we replaced our 180

hardware with a Dictaphone System 193 Word Controller Console, which would handle most of our dictation needs. Though basically the same system as the 180, the 193 offered a number of important improvements: an analog computer in the console, a voice speed control and a fail-safe system that indicates machine malfunctions.

The analog computer automatically distributes dictation to the typist best able to handle it at the time. All of the tanks contain the same amount of dictation, which all but eliminates the overloading of either the tanks or the operators.

According to Leona Arthurs, our transcription supervisor, "With this type of system, the oldest dictation is transcribed first — except for priority dictation — and the workload is evenly distributed."

In order to avoid the clipping of dictated words that occurs on some dictation equipment, the 193 incorporates a buffered voice-operated relay. We've found that, in addition to providing excellent clarity, the mechanism lets the transcriptionist hear every word the author dictates.

Needed help for peak periods

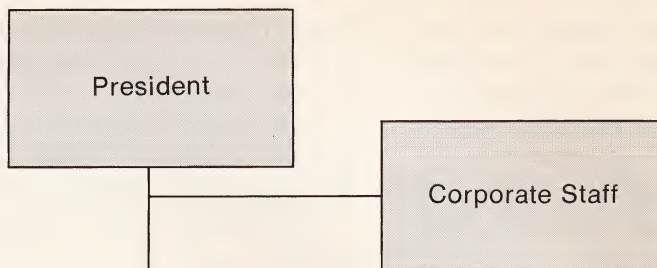
Also in 1977, the hospital made another in the series of gradual improvements in our WP set-up: Two



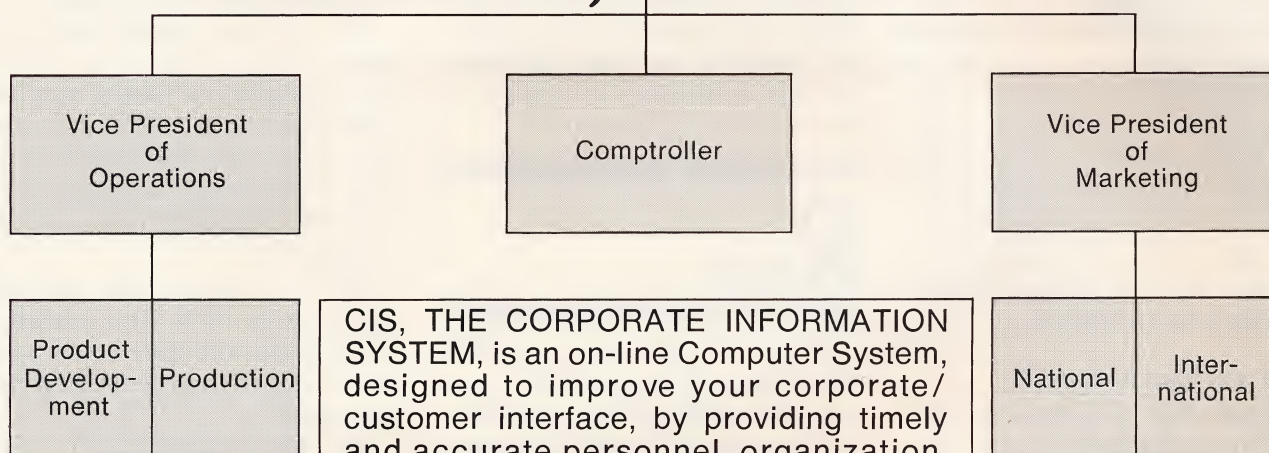
A buffered voice-operated relay mechanism allows the operator to hear every word the author dictates. Display text editors enable the department to create its own programs.



The supervisor of the transcription department answers a query on a patient status report dictated into the central dictation system.



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Circle No. 9 — See Center Spread

M BY BARBARA J. STEPHENS, R.R.A.
DIRECTOR OF MEDICAL RECORDS
UNIVERSITY OF COLORADO
DENVER, COLORADO

MEDICAL RECORDS UNDERGOES WP TREATMENT: PROGNOSIS IS FAVORABLE FOR INCREASED WORK

The Medical Records Department of the University of

Colorado Health Sciences Center handles 235,000 patient visits a year. The paperwork this generates is tremendous. Although the original WP system, installed 10 years ago, has been periodically upgraded, by 1977 it was clear that a major change was essential. After investigating systems from several vendors, the records department decided on a word processing system comprising an endless loop central dictation system and six text editors with printers. Since the system was installed, turn-around time has decreased dramatically, and individual operator productivity has increased by 25%.

PROBLEM:

Hospital medical records centers have, traditionally, been viewed as just rooms in which files are stored. However, today's climate of medical malpractice, accreditations, licensing and medical insurance programs has forced hospitals to reevaluate the role of the records center. Almost staggering informational demands have been placed on health care institutions, and, as a result, it is vital that all records be kept current and accurate.

As one of the largest teaching hospitals in the West, the University of Colorado Health Sciences Center's Medical Records Department comprises a good deal more than the file room, although that is certainly a mainstay of the operation. Also under the aegis of the department are the word processing center, the correspondence office, statistics, discharge analysis and micrographics.

Our university hospital, a short-term, acute-care institution, has a staff of 660 house physicians, 776

faculty and 200 clinical part-time physicians. The hospital provides in-patient service for nearly 18,500 people annually, while out-patient clinics and emergency services handle 235,000 patient-visits per year.

This results in an enormous amount of paperwork, which must be processed and stored by the Medical Records Department. During a typical month, for example, the word processing staff types approximately 252,000 lines, and the file room handles 50,000 patient files.

The problem faced by our word processing staff was two-fold: to comply with the aforementioned requirements while keeping up with the burgeoning volume of paperwork. Among the materials for which we are responsible are surgery reports, discharge summaries, physician referral letters and out-patient clinic notes.

Installed word processing

To handle this workload, Medical Records installed its first word processing system over 10 years ago. The initial set-up comprised a belt central dictation system and magnetic tape text editing typewriters.

DIGITAL FAX NETWORK MOVES MORE INFORMATION FOR LESS \$ AT GREAT NORTHERN PAPER

Problem:

Great Northern Paper produces more than 2300 tons of newsprint and groundwood printing paper a day from its 11 paper machines at Millinocket, Minnesota and its six machines at East Millinocket.

In view of the tonnage one of these block-long paper machines can produce in a very short time, economic common sense dictates that any changes that are made in the system's schedule or product should be communicated as quickly and as accurately as possible.

Initially, the firm tried phoning changes to its two mills. This procedure was fast, but it was subject to misinterpretation and lacked documentation. A key-to-disk data communications link was also tried. This system was accurate, but it was also expensive and created an uneven information flow to the mills' clerical personnel since it did not transmit data until a disk was filled and dumped.

Action Taken:

The solution to the problem — not only for communicating changes

by Rick Minicucci,
Managing Editor

CONSIDERING ITS PRODIGIOUS OUTPUT — 2300 TONS OF NEWSPRINT A DAY — GREAT NORTHERN PAPER NEEDED A WAY OF COMMUNICATING PRODUCTION AND ORDER INFORMATION QUICKLY AND ACCURATELY TO KEEP ITS SCHEDULING ON TARGET. TELEPHONE AND KEY-TO-DISK COMMUNICATIONS LINKS HAD PROVED INEFFICIENT ON A COST/RESULT RATIO. THE SOLUTION CAME IN THE FORM OF A HIGH SPEED DIGITAL FACSIMILE NETWORK, WHICH IS FAST, ACCURATE, RELIABLE AND EASY TO USE.

but for most paperwork communications — finally came in the form of a high speed digital facsimile network. After investigating a number of models currently on the market, Great Northern purchased eight 3M 9600 digital facsimile systems.

Facsimile units were installed at three branch offices — Boston, Chicago and Columbia, Maryland. In addition, scheduling fax machines were located at headquarters and at each of the two mills. The last two fax units, which are dedicated to the transmission of financial data, were installed at headquarters and at the Millinocket mill.

Great Northern's facsimile network operates in this fashion. Customer orders arrive at the Great Northern branch offices by mail and phone, and from the firm's own sales representatives on the road. They are checked and priced, then faxed to headquarters.

The Boston and Columbia branch offices, which have a high volume, have leased lines to the headquarters, while the Chicago office has dial-up service. The headquarters also has leased lines to the mills.

Once orders are received at headquarters they go to the Scheduling

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Circle No. 7 — See Center Spread



Department, where they are worked into a 12-month production plan, which is based on overall demand versus production capacity. Generally, salespeople must submit orders that fall within the production plan — which is updated quarterly — although some adjustment is possible.

Orders reviewed at headquarters

Each incoming order is also reviewed at headquarters for pricing, roll specifications, customer requirements for delivery and shipping dates. Then it is entered into the scheduling operation via a series of boards in the Scheduling Department.

Next,* the order goes to a clerk who enters it into the Great Northern computer system via a video display terminal. On the following morning, the computer prints out a hard copy for the scheduler, who cross-checks the information against his or her own data.

Scheduling Department personnel use the fax machines to obtain the production data from the mills. They put this information on the scheduling boards and also provide management with daily status reports on how well the paper machines are meeting their schedules.

The use of scheduling boards enables an inside sales rep to walk in and see at a glance the status of an order. The reps find this extremely helpful in responding to customer inquiries.

The Scheduling Department is also responsible for making up the paper machine lineups. The department combines jobs whenever possible to get the best trim with the least waste.

Each detailed, handwritten paper machine lineup is typed onto a pre-printed form and proofread by the scheduler. Next, it is faxed to the mill four to five days ahead of production. A backup schedule is also prepared and transmitted for use in the event of a production problem when headquarters is closed.

When the lineup arrives at the mill, the clerk removes it from the fax unit and makes copies for the production superintendent, finishing foreman, weigher, dispatcher, corer

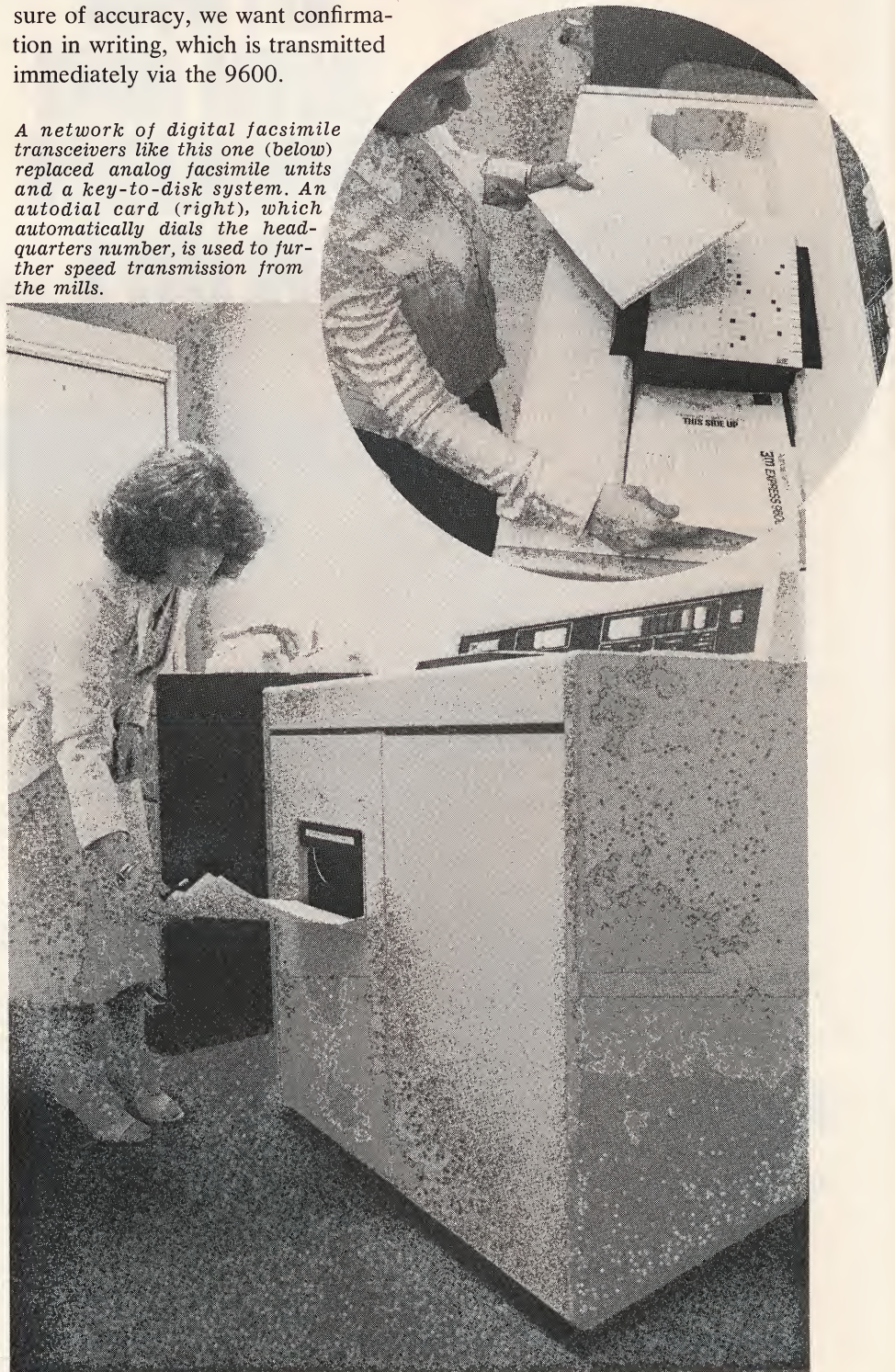
and so forth. In addition, mill management is advised of the general schedule a month out.

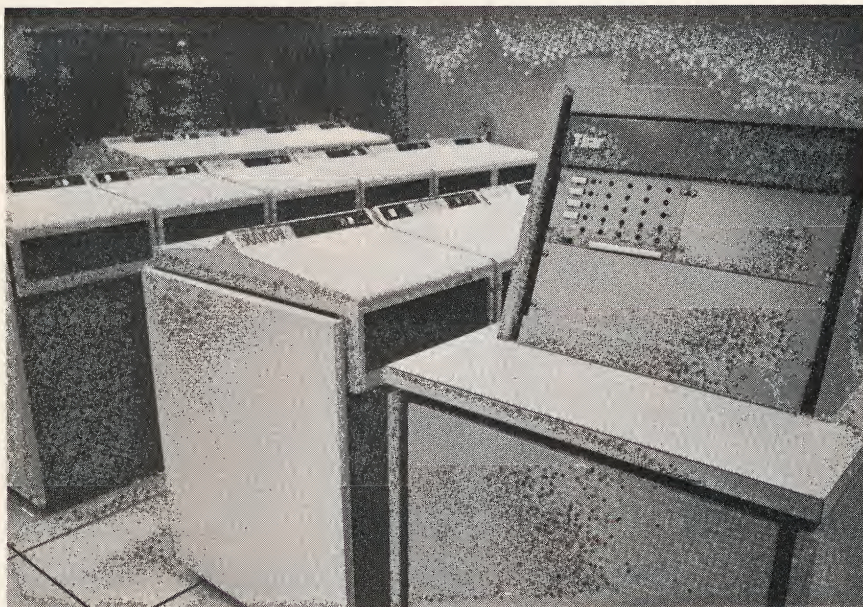
The facsimile network is also used to notify the mills of changes in orders. "For instance, if a customer wants a last-minute change in a roll size he has ordered, he phones his branch sales office, which phones our Scheduling Department in Stamford, which then calls me," explained David A. Woodbury, sales scheduling representative. "To be sure of accuracy, we want confirmation in writing, which is transmitted immediately via the 9600.

A network of digital facsimile transceivers like this one (below) replaced analog facsimile units and a key-to-disk system. An autodial card (right), which automatically dials the headquarters number, is used to further speed transmission from the mills.

"Often, the confirmation is handwritten. In the past, we couldn't get written confirmation until after the order had been run, and, as a result, expensive mistakes occasionally occurred."

In addition to data transmitted to the mills, there is also a great deal of information that is faxed to headquarters from the mills. This data includes: a daily report of all railroad cars held; daily shipment report corrections; daily machine





Thirteen disk drives were installed to operate the National Res-A-Vision data base. These drives provide the airline with 7¼ billion bytes of information storage. The T-bar switching device enables the tape drives to be accessed from any of the airline's mainframes.

was run against the data on the 3650s and the results verified, the Res-A-Vision was brought up successfully. Since that day, the system availability up-time performance of the Res-A-Vision system has dramatically improved.

Capturing data onto tape

The data on the 3650 disk drives that contain the Res-A-Vision system is captured onto the 3228 tape drives. (This job is run in the evening when the need for disk access is low.) Formerly, this process took four hours, but it is now done in less than one hour due to the high data transfer rate of the disk and tape drives.

After each capture, "exception recording" is started. This process writes the tape a record of all changes to the Res-A-Vision system data base as they are recorded on the disk drives. Should a disk failure occur, this information, along with the data from the last capture, enables operations to bring the reservation system back up to where it was at the time of the failure.

National is required to retain passenger records for investigative reasons after each flight is completed. Since the volume of this information prohibits its being stored on disks, the airline records all this historical information on the tape

drives. The tape drives are also used to gather statistical information, as well as record system error dumps and returned addresses of records on disk that may be reused by the Res-A-Vision system.

RESULT:

Switching to the Memorex disk and tape drive systems has been beneficial for National in a number of ways. For one thing, the ability to store more data on the disk drives has enabled computer operations to stay in the same facility, while greatly increasing the storage capacity of its data files.

"In addition," said Luhm, "we are experiencing an average response time of approximately 1.5 seconds. We have also reduced the time it takes to transfer information from disk to tape due to the high data transfer rate of the disk drives and the utilization of the new tape drives at 1600/6250 bpi vs. the previously used 800 bpi drives."

Soon the airline hopes to shorten this transferal process even more — by another 40 minutes or so — by utilizing the 3220 tape storage subsystem's ability to handle data transfer

rates at 1.25M bytes per second at a 6250 bits-per-inch density.

The system's real-time program is also allowing National to have critical information — such as number of seats sold on flights as far ahead as 340 days, passenger names, changes in passenger telephone numbers and changes in the number of passengers on the original reservation — stored directly on tape as it is recorded on the disks during the day. The advantage to this is that, should there be a disk failure, these tapes would be able to bring the system up to where it was at the time of the failure.

"We're very pleased with our tape and disk drive systems," said Luhm. "In fact, I believe we're the first major airline to operate a reservation system under the airline control program, using 3650 disk drives. They say that 'the first to buy is the first to cry,' but that certainly has not been the case here."

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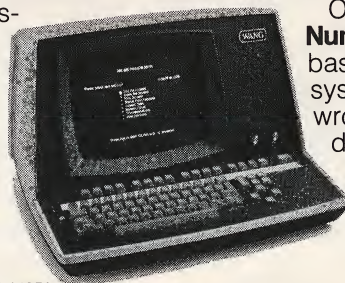
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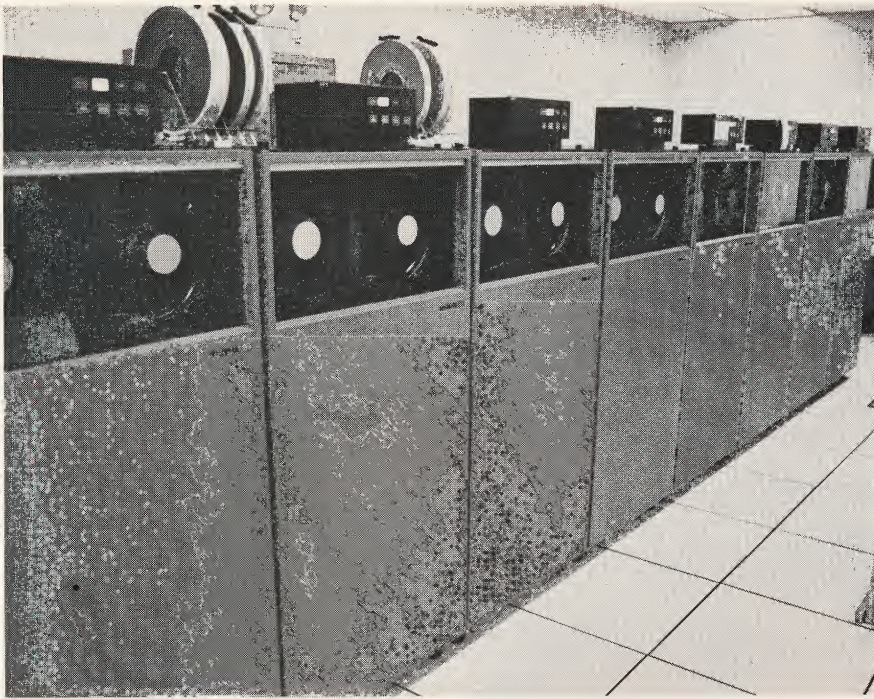
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Eight of National's magnetic tape drives are utilized by the airline's batch processing system, which provides data on aircraft maintenance, crew scheduling, payroll, personnel, pension and test-and-development work in new operating software.

two IBM 360s with three 370/158s, one of which is dedicated to Res-A-Vision. Concurrently, we advanced from DOS and OS/MVT operating systems to a complete MVS system, including the ability to operate an Information Management System (IMS)."

To complement the new computers, National decided about a year-and-a-half ago to upgrade the disk tape devices that it was using at the time. Russ Langley, senior manager of computer services development, headed the search for a new system. Manufacturers were judged on the basis of cost/performance, support and reliability.

"We had been using IBM 2314 disk drives," said Langley, "consisting of 54 spindles and holding 30M bytes of data each, but we simply did not have additional space to accommodate the extra units we would need to handle our ever-increasing volume. In addition, we would also have to pay for the electricity and air conditioning needed by these extra drives.

"After investigating several different systems, we decided on a Memorex 3650 disk storage system — primarily for storage of all current reservation information — and a Memorex 3220 magnetic tape drive

system, to function mainly as an archival facility."

Disks linked to mainframe

"Thirteen 3650 disk drives were installed to operate the Res-A-Vision system data base, which gave us a total of 7¼ billion bytes of information storage," said Woody Hanson, senior manager for technical services. "We linked three 3674 controllers and the 13 3650 disk drives to one

of the 370/158 mainframes to handle the Res-A-Vision system.

"An additional three controllers and 12 3650 disk drives were installed to handle our batch processing data. These drives are shared by our two other 158s. All of our disk drives can be accessed from any one of our three 158s."

The 3220 magnetic tape drive system comprises 16 3228 1600/6250-bpi tape drives and two 3222 tape controllers. Eight of these drives are used by the Res-A-Vision system, and the other eight are utilized by our batch processing system, which also provides data on aircraft maintenance, crew scheduling, payroll, personnel and pension, along with some test-and-development work in new operating software. The tape drives can be accessed from any of the 158s through a T-bar switching unit.

The actual conversion of the Res-A-Vision database from the IBM disk drives to the Memorex 3650s was achieved in 14½ hours. At the beginning of November 1979, on a Saturday at 3 p.m., National shut down its entire Res-A-Vision system until 5.30 p.m. the next day.

The data on the old disk drives was captured on tape and taken to the backup Res-A-Vision 158 and restored to the 3650s. After a recoup



Monitoring National's entire reservation system is the Res-A-Vision Control Console, which enables the operator to closely watch over the activities of the computer. The screen displays status information on the system's software and hardware and permits the operator to make modifications.

schedule positions, which are faxed as soon after 8 a.m. as possible and show how much remains to be done on each order in work; an export order report; and a production report, including truck shipments, coated schedule position, and uncoated and coated reject positions.

Also transmitted via fax is a variety of messages, such as those regarding early railroad car release, which usually occurs at the customer's request; grade structure schedule by machine; grade and dates to be run; average daily production; and total tons to be produced.

Result:

"Our new facsimile network provides speed and simplicity in our communication of sales orders from branch offices to headquarters, and in moving scheduling information and other data from headquarters to the mills," said Francis J. Dunne, Great Northern's manager of sales coordination. "The digital 3M 9600 facsimile transceivers are far faster, more reliable and more automated than the old analog facsimile equipment we used for sales orders, and are superior to the data transmission equipment we used to communicate with the mills."

The analog fax units, 3M Model 600s, transmitted documents at either four or six minutes per page, while the 9600s move them in 20 seconds. By contrast, the key-to-disk system didn't transmit data to the mills until a disk was filled and dumped, which sometimes delayed urgent messages.

"Now, we do not have to rely on data processing, which must also serve other users, to determine when to transmit documents or what item to give priority treatment," Dunne explained. "One of the 9600s is located in our department, and transmission is under our control."

"The system is also reliable — the 9600 won't send unless the message is being received — so it is no longer necessary for us to transmit a control document. Moreover, the new system is as simple to operate as an office copier. With our former disk



Each detailed, longhand paper machine lineup is typed onto a preprinted form, then immediately proofread by the scheduler who prepared it.

equipment, a trained operator was required at each end."

"Installation of the 9600s has virtually eliminated the chronic problems we used to have with the disk system," Woodbury said. "We don't know whether it was the disk equipment itself, the modem or the phone lines, but we had to start transmissions over again and again because of cutoffs and erratic operation."

"The greatest benefit we've obtained from the fax network is the immediate transmission of urgent information. Any data regarding a schedule change or rush order gets top priority."

"With the 9600, this problem has simply ceased to exist. The quality of the copies is better too. In fact, the 9600 can serve as an office copier."

Immediate transmission is a plus

"The greatest benefit we've obtained from the fax network," the scheduling rep continued, "is the immediate transmission of urgent information. Any data regarding a schedule change or rush order gets

top priority. With the disk system, machine lineup reports (schedules) came in batches, often requiring us to wait for something we needed immediately. Now, the schedule comes to us via the fax as soon as it is typed and proofed."

"In addition, the ease of transmitting hard copy has resulted in a change in operating attitudes," Dunne reported. "For example, if a salesperson wants to make a change in his forecast, he can transmit the data immediately to headquarters, then discuss it over the phone with a scheduler. The great thing about this system is that both people are working from identical data."

"There is no question that hard copy is much more reliable than verbal communications. With facsimile, transmitting that hard copy is less time-consuming than our former key-to-disk operation. And, the system is so simple that it requires little operator training. It is trouble-free, can run unattended and is simply a better communications medium for our needs."

In short, Great Northern's facsimile network moves information faster and more evenly than the previous system, and provides absolute accuracy at a substantial saving in telephone line costs and some reduction in labor costs. ⊕

NBY RICK MINICUCCI, MANAGING EDITOR **NATIONAL AIRLINES BREAKS 40-ACCESSES / SEC. RECORD WITH TAPE & DISK DRIVE SYSTEMS**

In 1979, when National Airlines was handling up to 40 access demands a second with its on-line reservation system, data storage was becoming a problem. The physical restrictions of the computer room ruled out expanding the current system's hardware. The alternative was to install a tape and disk system that could accommodate more data storage with drives able to handle heavy accessing. National obtained the necessary equipment and linked it directly to the company's three mainframes. Not only does this system take up less space than the previous one, but, in addition to satisfying the rapid access and heavy storage needs of National's reservation system, it is also handling the airline's weather reports, payroll, crew scheduling and inventory.

PROBLEM:

As far back as 1974, store-and-access demands from National Airlines' reservation and ticket agents — up to a million a day from over 1000 terminals throughout the United States and Europe — had begun outstripping its computer system's capabilities. The airline's data processing center just couldn't keep pace with the on-line reservation system, and the strain seemed to be worsening from month to month.

Various kinds of reservation information — including passenger names, flight numbers, cities of origin and destination, fare status, number of seats remaining on the plane and seating configuration of the plane — had to be stored and available for immediate access by hundreds of ticket agents.

This access demand was constantly increasing — up to 40 requests per second during heavy periods. Unfortunately, it was not uncommon for the system to go down several times a day for a min-

ute or two; though of short duration, these interruptions were costing National business.

In addition to the major burden of handling Res-A-Vision, National's on-line reservation system, the airline wanted its data processing system to keep track of weather reports for all of its daily flights. Up to now, weather information had come in from numerous locations via teletypewriters, and National had been wasting hours of time manually sifting through reams of paper in order to find out what the weather is like on each of its air routes.

Payroll, crew scheduling and inventory were other areas that National wanted to group together under the umbrella of a new, comprehensive data processing system.

ACTION TAKEN:

"To alleviate this crush," stated Fred Luhm, director of computer and communications services, "we upgraded our CPUs, replacing our

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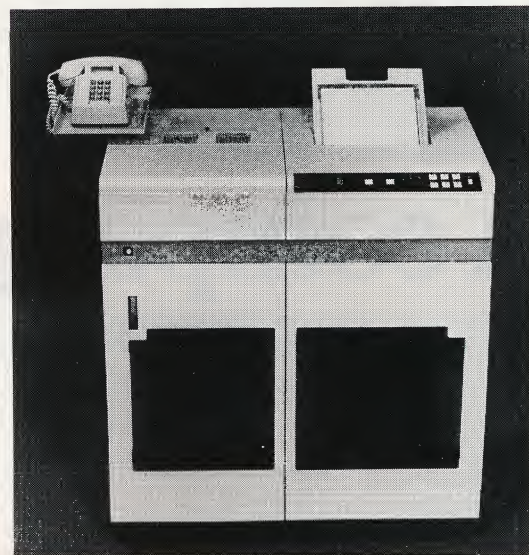
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of the call, four-and-a-half minutes. This and the cost saving resulting from the use of the less expensive microwave and satellite technologies are predominantly responsible for the cost differential.

Result:

We have, through the use of SPRINT, reduced our long distance toll charges by between 20 and 30 percent while concurrently improving our business effectiveness. What's more, the system has allowed us to reduce these costs immediately and measurably without any significant investment in new equipment.

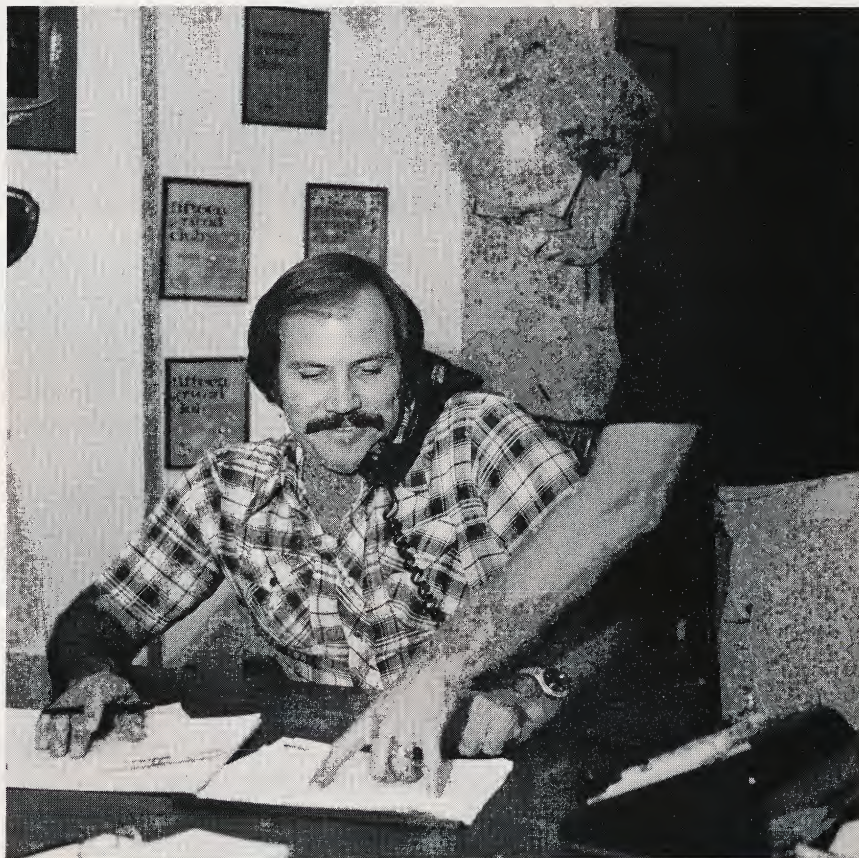
Dunhill of San Diego, the largest of the firm's offices in terms of monthly billing, was one of the first franchises to adopt SPRINT. Before we started using the system, our long distance toll charges averaged between \$4000 and \$5000 per month. By the end of the first month after accessing SPRINT, those charges dropped to between \$3000 and \$3500. In addition, we found it to be immediately less expensive than, and equally as serviceable as, the usual telephone company long distance and WATS lines.

Another immediate advantage of the new system was that it became possible for us to account for how and when long distance calls were being used by assigning a separate code to each of our consultants. When our SPRINT billing comes in, we have direct accountability for phone usage.

We know which of our employees made the call, to where, for how long, how often and, generally, for what placement. We also have a monthly picture of our consultants' working habits based upon exactly how they are using the phone system.

Calls can be made at home

Because of the nature of the personnel business, much employee interviewing is done in the evening. With SPRINT, our people can make calls from their pushbutton phones at home, automatically charging the calls to the office. During the evening, for instance, Dunhill Chicago can call the West Coast, where peo-



By subscribing to a satellite/microwave communications network, Gary van Eik and Richard Papike, partners in Dunhill San Diego, have trimmed long distance expenses by \$2000 a month.

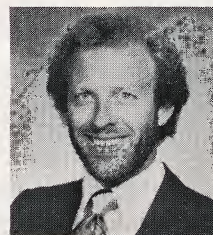
ple are still working, at reduced rates.

Furthermore, I and other personnel consultants travel extensively. By using the local SPRINT access phone number, calls made while on the road can automatically be billed to the office. This eliminates the time-consuming employee tabulation of calls made from personal phones and while travelling. It also does away with expense account repayment for such calls, which had been running in the range of \$20 to \$30 for each employee.

The SPRINT V System has enhanced the effectiveness of many of Dunhill's operations. It has permitted more long distance communication for the dollar, and has provided greater flexibility of long distance usage.

Presently, our monthly phone charges average about \$9500: \$3500 are SPRINT costs, while the remaining \$6000 are regular phone company direct-dial costs. Since the SPRINT network is not yet available in all parts of the country, it is, of course, still necessary for us to util-

ize normal phone lines to reach those areas, as well as to make local calls. Besides, the SPRINT network only provides the long distance hook up (the middle). Telephone company lines are accessed at both ends of the call. We estimate that without SPRINT our bills would average at least \$2000 more per month. The saving achieved with SPRINT adds up to almost \$25,000 per year. ☼



Richard Papike, vice president and part owner of the Dunhill San Diego agency, has been with the firm for eight-and-a-half years. During his first six years with the company, Papike was one of the top five counselors in all of Dunhill's 300 offices.

Put Your Company in the CORPORATE SYSTEMS Spotlight

If your firm has an innovative office system that you would like to have featured in CORPORATE SYSTEMS, contact Eileen Tunison, editor, CORPORATE SYSTEMS, 645 Stewart Avenue, Garden City, NY 11530, (516) 222-2500.

what's possible, what's available to help your business function more efficiently, more effectively, more profitably.

For example, your firm doesn't have to be a giant to enjoy the tremendous advantages

A company is as efficient as

Office files. Documents. Microfiche. Tape reels. It all may sound like low priority problems to the executive charged with bottom-line responsibility. But if you leave decisions about the filing and retrieval system of your company's documents to others, you may have to put up with incomplete reports, missing information, faulty customer communication and service. Unless you take the initiative, you may never learn what's new,

of Supreme's automated Minitrieve™ system. This simple-to-install, simple-to-operate pushbutton filing system improves your business in many ways. It reduces the use of valuable floor space. It increases work flow, service and consequently profits. It improves employee morale and cuts turnover by eliminating the boredom and drudgery of manual filing. It frees your personnel for other, more productive functions. In fact, by making filing much less physically demanding, it allows you to make use of mature, stable and reliable employees.

PHONE SYSTEM RINGS BELL FOR DUNHILL; SAVINGS REACH \$25,000 A YEAR

by Richard Papike
Vice President/Partner
Dunhill Personnel Systems
San Diego, California

At Dunhill Personnel Systems of San Diego, telephone costs were going through the roof, and much time was being wasted while consultants waited for open lines. In 1978, the firm switched from a WATS set-up to a private phone system. Long distance calling is now more efficient and economical; communications costs have dropped 30 percent and business effectiveness has improved.

Problem:

Dunhill Personnel Systems, with 300 franchised offices, is one of the largest national and international employment services in the world. Our business is strictly one of communication, and the telephone is one of our most useful tools. As a result, after payroll, communication costs are our highest operational expense.

At Dunhill of San Diego, our personnel consultants are on the phone for approximately 80 percent of their working hours, searching extensively to find people to fill positions for our Southern California clients. Seven of our 18 consultants conduct employee searches on a national basis, which means they must call prospective job candidates in all parts of the country.

Over the years, our experience has taught us that the higher we go in an executive search, the less necessary it is to actually interview the prospective job candidate face-to-face; we must simply find the most qualified individual ready to make a move. All of this "legwork" is done over the phone, so the efficiency and economy of our phone system and procedures are of paramount importance.

Until 1978, we had been subscribing to two telephone company WATS (Wide Area Telephone Service) lines. There were five consultants working at our national desk, but because we only had the two WATS lines, three people would sit idle until one of the two lines was available. This was certainly not an efficient or economical situation.

It was, however, the only game in town — or so we thought, until we were made aware of the existence of a private phone system to which we could subscribe that would, purportedly, save us a considerable amount of money.

Action Taken:

More than 10 years ago, the Southern Pacific Railroad established a telecommunications network to provide for its communication needs. Then in 1970, a subsidiary, Southern Pacific Communications (SPC), was formed to

create an independent network, making the railroad's communications service available to subscribers.

Designated SPRINT, the resultant network is an alternative service employing microwave and satellite communications systems. Today, the network operates in 80 metropolitan areas and has more than 40,000 subscribers. About three years ago, after testing the system, Dunhill of San Diego became a subscriber.

Our particular phone system is called the SPRINT V, and its use requires no special equipment other than a typical pushbutton telephone.

Accessing the system is simple. Once we gave SPC the go-ahead, they assigned us a seven-digit access code that acts as a password into the SPC network.

To place a call, the user dials that number with a six-digit confidential authorized code, and then dials the area code and phone number in normal fashion. Finally, the caller may enter an optional two-digit code that segregates billing by assigning the call to a particular individual or client.

The SPRINT V system allows our consultants to make calls on their regular pushbutton phones at rates that are about 25 percent less than those that would normally be incurred through the use of phone company lines. A SPRINT user pays a basic monthly charge of \$10, along with a \$25 per month minimum usage requirement. Calls made on the SPRINT system, however, can cost substantially less than usual, despite these charges.

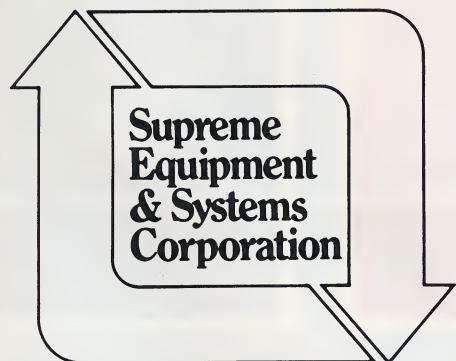
For example, the phone company charges \$2.12 for a four-and-a-half-minute call from San Francisco to New York during the workday. SPC's SPRINT charges \$1.49, resulting in a 29 percent saving. One of the reasons for the rate differential is that Southern Pacific's charges are based on smaller billing units. The phone company's rates are based on one-minute intervals; SPC uses six-second intervals.

Therefore, going back to the example, Dunhill would pay the phone company for a five-minute call, while it would pay SPC for the exact time

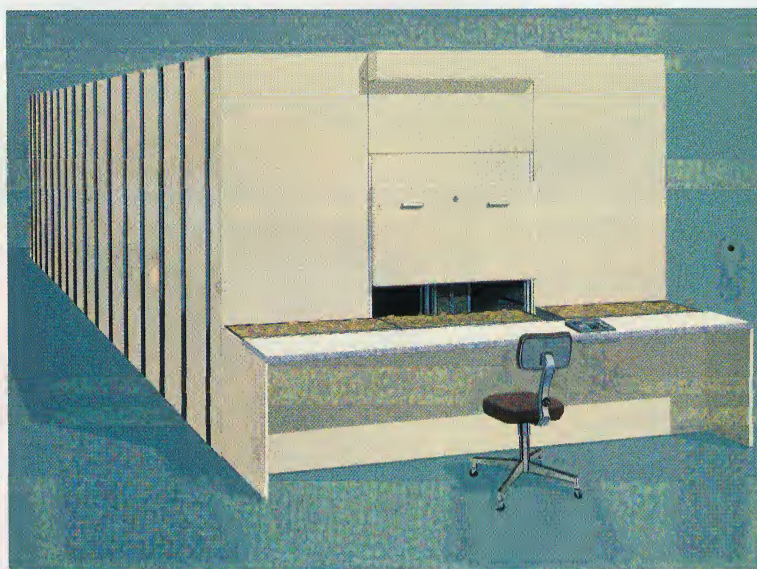


its filing system.

Filing is too important a part of your business to leave decisions about it to others. We'll be delighted to fill you in on the important advances that are available to your company.



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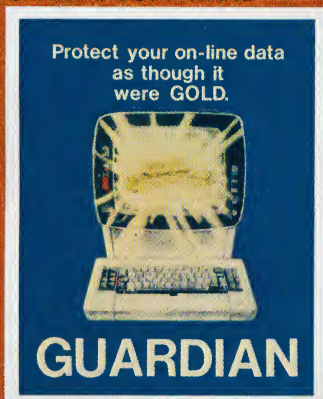


You can order standard Minitrieve™ units just as you'd order a file cabinet; thousands are in use throughout the country in offices that need the equivalent of 18 or more four-drawer cabinets.

Ad Gallery

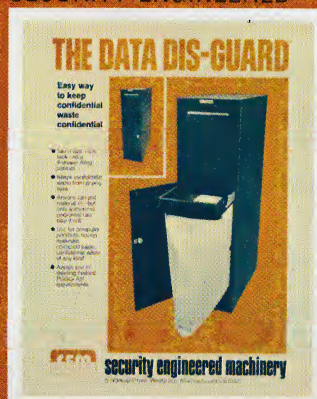
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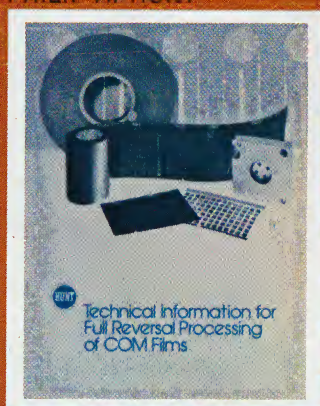
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RCA-COMMUNICATIONS



RCA Data Services' brochure provides details on the efficiency of 30 cps Dataphone and the flexibility of TWX from the high speed TerminiNet 30 ASR. circle no. 27

PHILIP A. HUNT



The photographic processing of computer output microfilm is the subject of a brochure from Philip A. Hunt Chemical Corp. circle no. 28

MICROFILM ENTERPRISES



Microfilm Enterprises' brochure gives specifications on the firm's modular Microfile cartridge and roll film storage system, which comes with interlocking modules. circle no. 29

OPEX



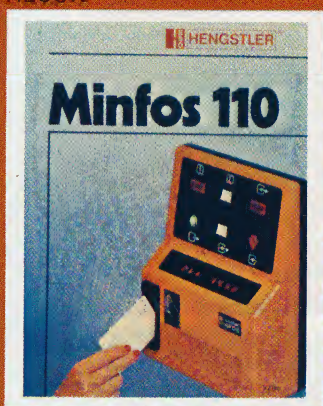
The OpeX Incoming Mail Processing System offers features and advantages which permit the clerk to concentrate on accurate, expeditious handling of your mail. circle no. 30

VIDEO TEK



This unique video security system tracks the intruder, reduces theft, vandalism, and false alarms. VISIGARD has been proven 20 times better than existing systems. circle no. 31

HECON



A computerized time administration system, with software designed for the implementation of flexible work hours. Another line FLEXTIME innovation from the HECON Corporation. circle no. 32

UNITED TECHNICAL



Compu-Carpet's high performance anti-static carpeting is described in a brochure available from United Technical Products. The carpeting comes in Executive, Designer and Commercial Series. circle no. 33

WANG LABS



Wang's line of word processing systems ranges from single, standalone units to multi-user, multi-function systems. These word processors provide more control over workflow, thereby increasing productivity. circle no. 34

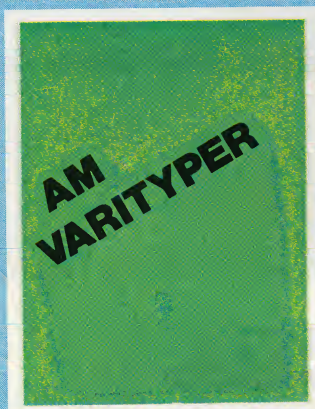
SIEMENS



T-1000. Brochure describes all electronic telex or private wire terminal. Quieter, smaller and as easy to use as electric typewriter. Wide range of convenience features and options. Up to 133 WPM. circle no. 35

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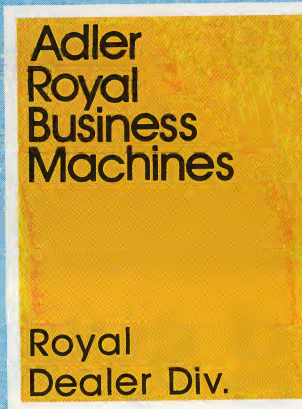
AM VARITYPER cv. 3



For more information on AM Varityper Photo Type Setting Systems...

circle no. 1

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For information from Adler/Royal Business Machines...

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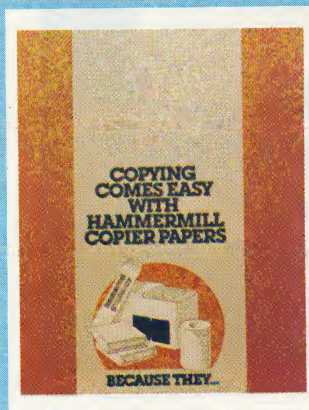
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For more information from Bell & Howell...

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Lists all major copiers, both the old and new, and recommends the Hammermill grade designed for optimum performance on each type of machine.

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PHILIP A. HUNT p. 5



The photographic processing of computer output microfilm is the subject of a brochure from Philip A. Hunt Chemical Corp.

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For more information from Inter Active Systems...

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SP/DMS (A SOUTHERN PACIFIC CO.) p. 27



For more information from SP/DMS (A Southern Pacific Co.)...

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BOORU



A brochure describing age and firm's line

SUPRI EQUIP

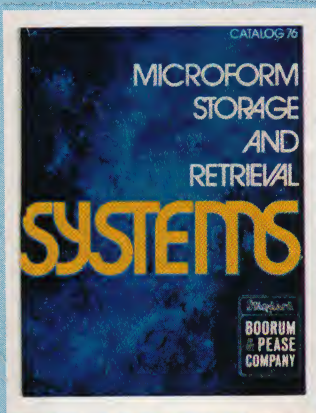


For more retrieve from S tems...

CATALOG SERVICE

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BOORUM & PEASE cv. 4



A brochure from Boorum & Pease describes various microform storage and retrieval systems in the firm's line of products.
circle no. 4

A.B. DICK pp. 10, 11



Literature from A. B. Dick spotlights the Magna II line display, which provides a "window into memory."
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G.E. VIDEO p. 46



Brochures from General Electric describe the PJ5000 Color Video Projector and the Large Screen Monochrome Video Projector.
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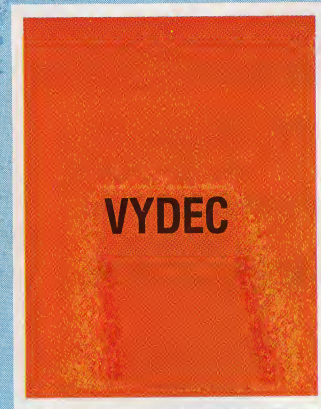
from Pacific

SUPREME EQUIP. pp. 28, 29



For more information on the Mini-Trieve Automated Filing Systems from Supreme Equipment & Systems...
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VYDEC cv. 2 & p. 3



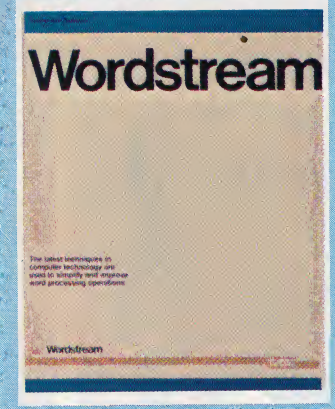
To learn more about the new word processing system from Vydec...
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WANG LABS p. 25



Wang's OIS/145 offers a full range of information handling capabilities. It supports up to 32 devices and provides quick and easy access to up to 110,000 pages of text.
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WORDSTREAM pp. 50, 51



A brochure from Wordstream Corp. discusses the features and advantages of its word processing systems.
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